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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Sweden

I. General

1. For Sweden, as for most other countries, international cooperation in space is a prerequisite for developing space activities. The publicly funded space activities in Sweden are mostly (about 80 per cent) carried out through international cooperation, mainly with the European Space Agency (ESA) and through bilateral cooperation. Sweden's participation in international and, in particular, European space cooperation is one condition for the development of space-related activities in Sweden.

2. The main goals of the Swedish space programme are to retain and develop to the highest level acquired expertise in various fields of activity and to make Sweden an interesting and competent partner for international scientific and industrial cooperation.

3. Key programme areas are magnetospheric and ionospheric research, astronomical studies, remote sensing, observation of the Earth's atmosphere and environment, and specialized industrial competence, including the development of small, cost-effective satellites.

4. The development and coordination of space activities in Sweden have been entrusted to the Swedish National Space Board, a governmental agency under the Ministry of Industry, Employment and Communications.

II. Space research

5. The Swedish space research programme is comprised of publicly financed basic research activities that involve the use of sounding rockets, balloons and satellites in experiments. The main areas of the programme are classical space research and research in microgravity. Swedish space research encompasses large areas of modern physics such as astronomy, plasma physics, atmospheric physics, material physics, biophysics and fundamental physics.

6. Thanks to its position at a high northern latitude (68° N), Esrange is particularly well suited to observing the aurora and other high latitude phenomena and to receiving data from and tracking and controlling satellites in polar orbits. Esrange is operated by the State-owned company Swedish Space Corporation (SSC). Esrange is very suitable for all sounding rocket experiments that involve recovery, for instance for microgravity research.

III. Small satellites

7. The series of small cost-effective scientific satellites, such as Viking, Freja, Odin (launch planned for 1999) and Astrid 1, with control and data reception at Esrange, as well as the launching of sounding rockets and balloons constitute the backbone of the Swedish national space research programme. The most recently launched microsatellite Astrid 2 (launched in December 1998) is controlled by a newly developed, efficient semi-automatic control station at SSC headquarters in Solna.

IV. Earth observation

8. Swedish remote sensing activities are carried out primarily in cooperation with France (Satellite pour l'observation de la Terre (SPOT)) and within framework of ESA programmes, the European Commission and the Committee on Earth Observation Satellites. The main goals of Sweden's Earth observation activities are to support research and technology, to secure the continuity of global data and to promote the use of information from satellites for applications in society, particularly for environmental monitoring, forestry, meteorology and topographic mapping.

9. Sweden has increased its capacity to contribute to global environmental programmes through the satellite project Odin, the establishment of the Environmental Satellite Data Centre (MDC) in Kiruna and its participation in the Centre for Earth Observation within the framework of the European Community.

V. Transfer of knowledge: remote sensing courses

10. Sweden has acquired broad experience in remote sensing and geographic information systems at governmental agencies, universities and companies. This experience and know-how can be made available to developing countries where there is a need for mapping and other remote sensing applications. Thus, there is an increasing demand for the transfer of technology in the form of training personnel from developing countries. For that purpose, the Swedish Institute for Geographical Information Technology was established in Kiruna. The Institute offers training courses in practical applications of remote sensing.

11. The annual United Nations Training Course on Remote Sensing Education for Educators is carried out jointly by the Department of Physical Geography of Stockholm University and SSC Satellitbild in Kiruna. The main objectives of the course are to develop practical knowledge and skills in remote sensing technology among educators from developing countries and to enable them to introduce the discipline into the educational programmes in their own countries.

VI. Industrial development

12. The industrial development programme is aimed at developing technical know-how in the field of space in order to promote industrial competiveness and to support Swedish companies in the field of space. Sweden does most of this by participating in ESA programmes. There are three main space companies in Sweden: SSC, Saab Ericsson Space AB and Volvo Aero Corporation.

VII. Kiruna: a Swedish space centre

13. The town of Kiruna was chosen for conducting space activities because of its location in the auroral zone near the North Pole. The following institutes in the field of space activities are located in Kiruna: Esrange, the Swedish Institute of Space Physics (IRF), SSC Satellitbild, MDC and the Environment and Space Research Institute (MRI).

VIII. Further information

14. Further information on space-related activities in Sweden may be obtained from the following:

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Tel.: +46 8 627 6480 E-mail: rymdstyrelsen@snsb.se

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Abstract of the national paper of Denmark

I. Main objective of Danish space policy

1. The main objective of Danish space policy is to participate in European space cooperation, to build up new know-how in the area and to contribute to the establishment of relevant space-based systems that will benefit Danish society. In addition, Danish space policy should contribute to the continued strength, competitiveness and commercial impact of the Danish space industry, a position the industry has achieved through product specialization.

2. The objectives of the individual areas are as follows:

(a) *Space research*

(i) To obtain a prominent international position in chosen areas of research;

(ii) To strengthen the position of Danish research centres, groups at universities and other research and development and educational institutions;

(iii) To integrate space research into Danish national research policy;

(iv) To ensure a connection between present focus areas, for example, Earth observation/remote sensing, astrophysics/astronomy, solar system physics, space medicine and biology (microgravity) and other relevant research efforts at the national and international levels;

(b) *The application of space technology*

(i) To focus more on the benefits of various space activities in connection with prioritizing Danish programmes and participation in European Space Agency (ESA) programmes;

(ii) To increase the benefits, more emphasis should be placed on the immediate use of new applications of space technology;

(iii) To promote the application and technological developments in the space sector, public grants should be allocated primarily during phases prior to the commercial use of such services and prior to the sale of such technology on the open market;

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(c) *Industrial development*. The competitiveness of the Danish space industry should be strengthened by the following means:

(i) Continued participation in ESA programmes and its research and development programmes;

(ii) Closer coordination and cooperation between product development and research and development.

(iii) Participation in national space projects in order to stimulate innovative thinking and achieve synergy, also within areas that are not directly related to space activities;

(iv) Participation in the open marketplace, to create synergy between ESA activities and other national space activities;

(d) *Education and information*

(i) Increased emphasis on the education of scientists for the space sector;

(ii) Increased emphasis on strengthening space-related research and educational programmes at universities, institutes and so on;

(iii) Increased emphasis on strengthening the cooperation between space research, education, trade and industry;

(iv) Increased focus on national information activities to increase the understanding, visibility and market impact of space activities.

3. To achieve these objectives, Denmark should play an active role in international and national developments. Internationally, this should be achieved as follows:

(a) By influencing the means and objectives of ESA's scientific programme;

(b) By Danish participation in voluntary ESA programmes, with emphasis on activities that relate to the present and future needs of Danish society;

(c) By participating in other international space activities, including cooperation with the Russian Federation and the United States of America.

4. Nationally, this should be done by focusing on the prioritized areas described below.

II. Prioritizing focus areas

5. Danish resources for space research and industrial activities are limited. To achieve optimal results, it is therefore important to prioritize selected focus areas in accordance with the objectives.

6. An important aspect in prioritizing these areas will be to include projects and programme areas that meet more than one objective at the same time. On the national level, the Orsted satellite and the related research programme is a good example of such a project. Prioritizing focus areas must also be carefully coordinated with previous Danish decisions and applications in relation to the mandatory ESA scientific programme and other voluntary programmes. Seen in relation to the total annual appropriations for ESA programmes and other national programmes, the financial leeway for full implementation of a revised space policy—with respect to previous commitments to such programmes—is relatively limited, at least in the short term. Thus, opportunities for acquiring further resources for the sector should

be looked into, with reference to achievements in focus areas that have been previously prioritized.

7. The Research Advisory Board for Space has chosen Earth observation and small satellites as new primary focus areas. The remaining focus areas are the existing ones, namely, astrophysics/astronomy, solar system physics, space medicine and biology (microgravity). Earth observation has been chosen as a focus area because of the opportunities, for example, in the fields of climate and the environment. Research into climatic and other environmental conditions on Earth could become an important Danish contribution to an increased understanding of possible changes in global weather and climate (global change). Small satellites have also been chosen as a focus area because a Danish small satellite programme based on experience from the Orsted project could well become a key factor in Danish high-tech efforts both within space research and for future uses of space.

8. All the focus areas mentioned are well-founded and relevant, but are aimed to ensure the greatest possible Danish influence in ESA and in other areas, namely, Earth observation and small satellites, the primary focal points. The new, revised space policy must also emphasize cooperation and contact with the educational institutions. At the same time, the dissemination of information concerning space activities should be increased.

9. Parallel to national participation in these focus areas, Denmark's considerable efforts in telecommunications and other technological programmes will continue. Such activities, which are of great importance to Danish industry, will be governed to a very large extent by the demands of the marketplace.

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Abstract of the national paper of the Netherlands

I. Space activities of the Netherlands

1. The national space policy of the Netherlands is based on three interconnected objectives. The first objective relates to industry and technology and to maintaining and expanding capabilities both in industry and research facilities. These capabilities should benefit the user community of the Netherlands. The second objective relates to users and to promoting the use of data acquired from space. The third objective is political. The Netherlands regards independent European access to space as a strategic achievement. Moreover, the Netherlands feels that European cooperation in the field of space activities gives more substance to the collective responsibility for solving global problems, such as the enhanced greenhouse effect and the depleting ozone layer.

2. In order to be part of a wide-ranging European space programme, it is essential for the Netherlands to concentrate on participation in the European Space Agency (ESA). The average contribution currently amounts to about 3 per cent of the total budget of ESA.

3. The Netherlands has been actively involved in European space activities from 1962 onwards. In 1974, the Netherlands became the eleventh country in the world to produce its own satellite. Nowadays, the Netherlands spends about 120 million euros per year in space activities. About 75 per cent of the space budget is earmarked for ESA programmes. The rest is spent on the European Organization for the Exploitation of Meteorological Satellites (EUMETSAT) (5 per cent) and national and bilateral activities (20 per cent). The largest part of the space budget stems from the Ministry of Economic Affairs, which has primary responsibility for the national space policy. The Ministry of Education, Culture and Science also plays an important role, especially in maintaining the leading position of the Netherlands in astronomy and astrophysics. Other ministries using space applications include the Ministry of Transport, the Ministry of Public Works and Water Management, the Ministry of Agriculture, the Ministry of Nature Management and Fisheries and the Ministry of Development Cooperation.

4. The Interdepartmental Committee on Space formulates national space policy and advises the Government on participation in space programmes. The Interdepartmental Committee on Space is chaired by the Ministry of Economic Affairs and has among its members representatives of six other ministries, as well as three advisory members. These include:

(a) The Netherlands Agency for Aerospace Programmes (NIVR), an independent organization initiating and monitoring aerospace research and technology programmes, as well as managing national space programmes;

(b) The Space Research Organization Netherlands (SRON), responsible for research programmes including development of space instruments and interpretation of astronomical and Earth observation data;

(c) The Netherlands Remote Sensing Board (BCRS), which coordinates and initiates the application-oriented use of Earth observation data.

II. The position of the Netherlands on the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space

5. The Netherlands regards "Space Benefits for Humanity in the Twenty-First Century" as a suitable theme for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III). The Netherlands has been making efforts to utilize space technology, such as products involving remote sensing data, to accelerate socio-economic development in countries like Burkina Faso and Viet Nam. Furthermore, the Netherlands is involved in environmental efforts at both the local and global levels.

6. UNISPACE III will provide an opportunity for bringing together participants from industrialized and developing countries in order to explore the benefits of space activities. The presence of representatives of the space industry, as well as high-level officials and policy makers, should lead to a greater understanding of the capabilities of space applications for development purposes. Since the 50th International Astronautical Congress will be held in Amsterdam from 4 to 8 October 1999, the Netherlands will focus on bringing the Congress to the attention of UNISPACE III participants. The theme of the Congress will be "Space—An Integral Part of the Information Age". The International Astronautical Federation, in close cooperation with the United Nations, is organizing an annual space workshop for developing nations prior to the Congress. The United Nations/International Astronautical Federation Workshop on Space: An Integral Part of Sustainable Development will be held in Amsterdam and Enschede, the Netherlands, from 30 September to 3 October 1999. The theme of the workshop is closely related to the theme of UNISPACE III, thereby strengthening goals of UNISPACE III such as establishing partnerships between developing countries and space-related industry.

7. The Netherlands supports a strong United Nations Programme on Space Applications and feels that regional centres are the right place to execute the programme activities. Through the European Space Research and Technology Centre (ESTEC), established by ESA, the Netherlands hosts many successful training courses and workshops for participants from developing countries. The Netherlands supports the ESA proposal to continue the space application programme of the United Nations and ESA after UNISPACE III and to focus the programme on the operational aspects of space applications.

8. Another area of great importance for the Office for Outer Space Affairs of the Secretariat is space law. The Netherlands is one of seven States that are parties to all five outer

space treaties and it is constantly making efforts to further the development of international space law. Therefore, because of increasing national and commercial interests, the Netherlands feels that items such as the review of the outer space treaties and also new items like space debris deserve greater emphasis. Last but not least, the Netherlands favours adjustments of the agenda of the Committee on the Peaceful Uses of Outer Space that will lead to less time-consuming and more cost-effective meetings.

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Abstract of the national paper of Japan

I. Introduction

1. Japan has been promoting its space activities, including the development of various transportation systems and satellites and participation in international cooperative projects such as the International Space Station programme, to benefit all mankind.

2. The two main space agencies in Japan are the National Space Development Agency of Japan (NASDA), established in 1969, which is the central body responsible for implementing space development programmes and for promoting space utilization, and the Institute of Space and Astronautical Science (ISAS), established in 1981, which is the central body to conduct space science research.

3. Japan's space development is coordinated by the Space Activities Commission, which plans, reviews and decides upon important policies and the overall allotment of responsibilities among ministries involved in space development. It is carried out exclusively for peaceful purposes under the Fundamental Policy of Japan's Space Development. The Fundamental Policy formulated by the Space Activities Commission serves as Japan's basic space development policy, indicating the direction and the scope of space development for about a decade. The basic principles are as follows:

(a) Promotion of creative science research and technology development;

(b) Encouragement of development to meet social needs;

(c) Organization of economically oriented space activities;

(d) Active promotion of international cooperation;

(e) Well-balanced development of manned and unmanned space systems;

(f) Development of the space industry;

(g) Preservation of the space environment.

4. The space development budget of the Government of Japan for fiscal year 1999 is 251 billion yen, a 1.5 per cent increase over the previous fiscal year.

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II. Space activities

A. Earth observation and Earth science

5. Earth observation by satellites contributes a great deal to Earth science and its applications, including weather forecasting, prediction of climate change, monitoring oceanic phenomena, geology, exploration of the Earth's resources, vegetation, agricultural products and the oceanic ecosystem.

6. The Marine Observation Satellite-1 (MOS-1), launched in 1987, was the first Earth observation satellite in Japan and was followed by MOS-1b, the Japanese Earth Resource Satellite (JERS-1), the Advanced Earth Observing Satellite (ADEOS), the Tropical Rainfall Measuring Mission (TRMM) and others.

7. Japan is currently developing the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER), to be installed on the EOS AM-1 satellite of the National Aeronautics and Space Administration (NASA) of the United States of America and on ADEOS-II, and the Advanced Microwave Scanning Radiometer-E (AMSR-E), to be installed on NASA's EOS PM-1 and on the Advanced Land Observing Satellite (ALOS).

8. As for weather forecasting, since 1977, Japan has launched a series of geostationary meteorological satellites, the data from which are used also in Asian and Oceanic countries. The follow-on satellite, the Multi-functional Transport Satellite (MTSAT), will be launched in 1999 with an added mission for air traffic services.

9. The Frontier Research System for Global Change, established in 1997, conducts research on global change mechanisms and model development using satellite data in the field of Earth science.

B. Space science

10. Space science is pursued in order to enrich the intellectual heritage of humankind and challenges us to solve fundamental questions about how the universe was born, how it evolved and what it will be like in the future.

11. At present, six scientific missions are ongoing in Japan, Akebono, Yohkoh, Geotail, Asca, Halca and Nozomi. The success of the very long base interferometry (VLBI) space satellite Halca (or Muses-B) and the first Japanese Mars orbiter Nozomi (or Planet-B) indicates that Japan's space science activities have entered a new era and that Japan is ready to tackle more ambitious projects, including lunar/planetary exploration.

12. Future missions are Lunar-A, for the exploration of the internal structure of the Moon, Astro-E, for the observation of black holes and active galaxies, Muses-C, for asteroid sample return, Astro-F, for infrared astronomical observation, Solar-B, for observation of the Sun, and Selene, for investigation of the Moon.

III. Space utilization and manned space flight

13. The space environment is characterized by microgravity and high vacuum. Research on how to utilize the space environment will contribute significantly to acquiring new scientific knowledge and creating key technologies. Japan performs space environment utilization experiments using small rockets, recoverable capsules, the United States space shuttles and an unmanned space experiment system, including the Space Flyer Unit launched in 1995 and the Unmanned Space Experiment Recovery System, to be launched in 2001.

14. In the International Space Station programme, Japan provides the Japanese Experiment Module (JEM), which is Japan's first orbital laboratory. JEM is expected to play a central role in the construction of an integrated research structure, which closely links research activities both in space and on the ground. The development of JEM is being undertaken with a view to its launch aboard three United States shuttle flights starting in 2002.

15. Manned space activities have significant implications in terms of exploring the possible expansion of human activities, acquiring new scientific knowledge and pursuing effective space utilization. Experience and know-how about crew selection, training and health care have been accumulated during the development and operation of JEM and the use of United States space shuttles.

D. Communications, broadcasting and positioning

16. Communications, broadcasting and positioning are three of the most familiar forms of space utilization in daily life. Historically, space activities in communications and broadcasting were undertaken mostly by the Government. However, since 1989, the private sector has successfully launched several communications satellites and many telecommunications companies have engaged in the communications business and the communications satellite broadcasting business. At present, analog broadcasting services are being provided via broadcasting satellites, and digital broadcasting using such satellites will start at the end of 2000.

17. To date, experiments on and developments in advanced communications and broadcasting technologies using the Engineering Test Satellites (ETSs) and the Communications and Broadcasting Engineering Test Satellite (COMETS) have been promising. ETS-VIII will be launched in 2002 for mobile broadcasting and other purposes. In addition, Japan is now promoting research and development on an ultra-high data-rate satellite communications system, a global multimedia mobile satellite communications system and others.

18. The Global Positioning System (GPS) is widely used in Japan in such fields as aeronautical/maritime/vehicle navigation, diastrophism observation, construction and surveys. Japan is developing basic technologies to improve positioning accuracy and is considering the possibility of international cooperation projects.

E. Space infrastructure

19. The expansion, sophistication and advancement of space activities require that Japan strengthen its space infrastructure in order to ensure the unrestricted deployment of its own space activities. The efforts made to date have resulted in the H-II, J-I and M-V launch vehicles, by means of which Japan has acquired a wide variety of launch capabilities. Japan is now developing H-IIA, to meet diversified launch demands in the twenty-first century at lower cost, Hope-X, with a view to accumulating technology for future reusable transportation systems, and the H-II transfer vehicle, to supply logistics to the International Space Station.

20. Key technologies necessary for flexible space activities in the future, such as unmanned rendezvous docking experiments and space robotics experiments, are being conducted using ETS-VII and the technologies necessary for data relay satellite networks are being acquired through ETS-VI, COMETS and the Data Relay Test Satellite (DRTS).

F. Space industry

21. The turnover of the space industry in Japan in fiscal year 1997 amounted to about 378.5 billion yen, an 11.8 per cent increase over the previous year, and there were 9,500 "space" employees in 1997. Since the Japanese space industry was not competitive because of high costs and lengthy lead times, space product exports were limited to parts and

components. Recently, however, a Japanese company received an order for a geostationary Earth orbit satellite and orders from foreign companies for several commercial launch services using the H-IIA rocket.

22. Japan is now developing the Space Environment Reliability Verification Integrated System to monitor commercial off-the-shelf parts and technology under severe space environment conditions in order to enlarge the space market by cheaper, faster and better commercial off-the-shelf technology.

IV. International cooperation in space activities

23. Japan believes international cooperation in space activities is becoming increasingly important and actively seeks to promote international cooperation, aimed at obtaining space benefits for all human beings, by playing a major role in the development of space technology and its applications.

A. Multilateral cooperation

24. In 1981, Japan formed the Inter-Agency Consultative Group for Space Science with the principal space agencies conducting space science research in Europe, the Russian Federation and the United States. Japan also continues to contribute to the Committee for Earth Observation Satellites by exchanging information among countries, as one of the secretariat countries of the Committee. Japan has held the Asia-Pacific Regional Space Agency Forum for international cooperation on space activities among countries in Asia and the Pacific since 1993.

25. Japan has implemented the PARTNERS project with five Asian countries, which has introduced tele-education and tele-medicine and contributed to the training of scientists and researchers in those countries and to the transfer of technology. The second phase of the Post-PARTNERS project is now being implemented.

26. Japan also prepares the Global Map, which provides the core data in the Geographic Information System for the environment in some Asian countries. As one of the 15 partner States in the International Space Station programme, Japan plays an important role in the programme, as mentioned before.

B. Bilateral cooperation

27. Japan has cooperated with many countries, including Canada, France and the United States, and with the European Space Agency, in fields such as Earth observation, space science and space utilization. Japan has also directed cooperative efforts with countries in the region of Asia and the Pacific, especially in the area of Earth observation in direct reception, pilot projects, seminars, workshops and the like.

C. Others

28. In addition to the cooperation projects mentioned above, the Japan International Cooperation Agency dispatches experts to developing countries and provides training courses for young scientists and researchers from developing countries. Training assistance for young scientists and researchers is also provided by the Government of Japan and the Japan Society for the Promotion of Science contributes to the training of scientists and researchers in developing countries.

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Abstract of the national paper of Spain

I. The environment, natural resources and remote sensing

1. Earth observation by means of images received from artificial satellites is today a well-established means of generating reliable information on the Earth's resources and environment.

2. Spain's administrative, academic and scientific institutions have attained a high level of scientific and technical development and the necessary capabilities to ensure that the present role of remote sensing as a powerful tool in environmental management will be strengthened in the near future.

3. The ability to use multitemporal image data is opening up many possibilities for conducting dynamic ground studies and producing updates based on data comparison. Such data, captured at different dates, have helped to make possible the early detection of the onset of certain disasters and identification of the effects of acid rain, the monitoring of repopulation and the assessment and calculation of areas affected by forest fires.

4. Information transmitted by satellites is used for weather forecasting, atmospheric monitoring and predicting the effects of climate change on agriculture, forestry, fisheries and so on.

II. Navigation, location and positioning systems

5. Spain's authorities consider the project concerning the future global satellite navigation and positioning system to be of considerable strategic importance and regard its development as a priority. That view is based on the economic, industrial, technological, social (employment), security, defence and other benefits stemming from the development, implementation and operation of this type of system.

6. The Global Navigation Satellite System (GNSS) is scheduled for implementation in the year 2003. During the initial phase, known as the European Geostationary Navigation Overlay Service (EGNOSS) (GNSS-1), it will be used in conjunction with the Global Positioning System (GPS) of the United States of America and the Russian Federation's Global Navigation Satellite System (GLONASS). Its establishment as a system for civilian use under European control will begin in the year 2010, this second phase being known as EUROSATNAV (GNSS-2).

7. Spain participates in the COSPAS-SARSAT search and rescue programme, the purpose of which is to help locate victims of accidents by the use of polar-orbiting satellites.

III. Review of space communications and applications

8. Spain's authorities have formulated and developed a policy of deregulation with regard to telecommunications, in line with European Union directives and in accordance with the basic telecommunications agreements of the World Trade Organization. As a result of that policy, the satellite communications market is now highly competitive, with standards comparable to those of the most advanced countries.

9. Satellite communications and applications in Spain have undergone significant developments, in particular owing to the Hispasat satellite telecommunications system. In addition, Spanish enterprises possess the technology and experience in the field to enable them to be highly competitive.

10. Moreover, the development and use of new technologies (research and development) have been fostered by the authorities, with the promotion and encouragement of specific activities in cooperation with the enterprises of the sector.

IV. Promotion and development of space research in Spain

11. Prominent among the main efforts undertaken in Spain in recent years are measures aimed at developing basic space science and related sciences. Not only have the economic resources invested in this area doubled, but the number of highly trained scientists in this sphere of activity has also increased fivefold. In addition, a system has been established that will ensure regular and continuous funding for the sector.

12. An examination of the three areas into which these basic space science activities are classified (space astrophysics, exploration of the solar system and research into microgravity conditions) will show the results of considerable efforts that have led to significant progress in Spain's participation in space research activities.

13. A further notable endeavour is the Research Personnel Training Plan, a national programme for the training of young researchers that has been in operation since 1987 and under which a group of technologists has undergone training in areas of major importance to the industry, in particular through a special scheme as part of an agreement established with the European Space Agency (ESA).

V. Economic and social benefits of space activity

14. Spain has regularly participated in space activities conducted in Europe through ESA and its predecessors since their beginnings in the 1960s. In 1974, it was the eleventh country to place a satellite in orbit, the Intasat. When the Ministry of Industry and Energy, through the Centre for the Development of Industrial Technology, assumed responsibility for administration and representation in the Agency in the 1980s, it decided to establish and build up an internationally competitive industrial sector. This, together with the creation of the National Space Research Programme, led to the development of a highly skilled Spanish industry with a strong presence in the commercial markets and a scientific community of acknowledged prestige. Under the National Space Research Programme it has been possible

to undertake a number of national initiatives, such as the Minisat programme, for the development, manufacture, integration, placing in orbit and operation of small satellites.

15. Spain, with its industry and the ESA frame of reference, has contributed to space developments that are of undoubted benefit to society. Satellites are today an essential tool for weather forecasting, direct television broadcasting, telecommunications, geographical positioning, air, sea and land traffic control, environmental protection and many other operations that are increasing in number and producing a broad economic and social impact.

16. At the same time, space technology requirements have encouraged the establishment of a multidisciplinary sector, whose development has subsequently given rise to a large number of applications and innovations in other industrial sectors, ranging from aeronautics and motor vehicles to household appliances and sports equipment.

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Abstract of the national paper of the Czech Republic

I. Introduction

1. Space activities in the Czech Republic are a continuation of the space research experiments conducted by Czech researchers in the 1970s and 1980s within the framework of the Council on International Cooperation in the Study and Utilization of Outer Space (INTERCOSMOS) programme. After the political changes in former Czechoslovakia in 1990, Czech institutions could participate formally in the space missions of the European Space Agency (ESA) and the National Aeronautics and Space Administration (NASA) of the United States of America. One important step in that direction was a framework agreement for cooperation between the Czech Republic and ESA, signed in 1996. Other governmental agreements on scientific and technical cooperation have been signed, for example, with the United States and the Russian Federation. All these official documents have further increased the opportunities for the active participation of Czech scientists, researchers and representatives of industry in international efforts relating to the peaceful uses of outer space.

II. Space physics

A. Project Magion

2. The name Magion refers to a series of small magnetospheric and ionospheric satellites manufactured in the Czech Republic to be launched as "hitch-hikers" of Russian scientific satellites. Magions are designed to perform simultaneous measurements of space plasma parameters at two points that are not far from each other. The satellites also perform diagnostic research of particles actively injected from the main satellite. The Magion-type spacecraft have been selected as subsatellites of the Interball project. Magion 4 (C2-X) was put in orbit in 1995 as the Interball Tail Probe Subsatellite. Magion 5, the Interball Auroral Probe Subsatellite, was launched on 29 August 1996, together with the Interball 2 spacecraft, into an elliptic orbit with an apogee of 20,000 km and an inclination of 65 degrees. After only one day of operation, Magion 5 went out of control and ceased to transmit telemetric data because of a critical power shortage. The telemetric data analysis and laboratory tests showed that the failure was caused by a short circuit in the solar array, and it was decided that attempts to reactivate the spacecraft would be made periodically. After 20 months, on 6 May 1998, the spacecraft was successfully reactivated. The next day, all principal subsystems of Magion 5 were successfully activated. The satellite has been functioning well since then. The Magion

microsatellites, produced in the Czech Republic in collaboration with Austria, Hungary, the Russian Federation and Ukraine, have on board scientific instruments and sensors designed and built in Bulgaria, the Czech Republic, France, Hungary, Poland, Romania, the Russian Federation and Slovakia. The Institute of Atmospheric Physics of the Czech Academy of Sciences is the main designer and producer.

B. Micromeasurement of Satellite Acceleration project

3. In 1996, a microaccelerometer was flown on board Space Shuttle mission STS-79. The objectives of the experiment were three-axial acceleration measurements. This experiment was highly successful and has shown the excellent performance of the device.

4. Based on those results, a follow-up project, the Micro Measurement of Satellite Acceleration (MIMOSA) project, was begun at the Astronomical Institute of the Czech Academy of Sciences. The aim of the project is to launch a microsatellite with the accelerometer on board as the only scientific instrument. The core device of the experiment is an electrostatically compensated three-axial microaccelerometer with sensitivity reaching the level of 10^{-11} ms^{-2}. The satellite is now in its manufacturing phase and its launch is planned for the year 2000 or early 2001. An elliptical orbit has been chosen so that the mapping of the atmosphere will be as detailed as possible and the direct solar radiation pressure can be used to calibrate the device. The prime contractor for the MIMOSA project is the Company Space Devices in Prague.

C. International Gamma Ray Astrophysics Laboratory

5. The Czech participation in the International Gamma Ray Astrophysics Laboratory (INTEGRAL), a cornerstone astrophysical satellite mission of ESA, includes the development of the on-board optical monitoring camera (OMC) experiment, participation in the INTEGRAL Science and Data Centre and the preparation of a ground-based segment with the related test and supporting experiments. The participation in the OMC experiment focuses on the ground-based OMC test camera device and on the OMC image simulator. The work is coordinated by the Astronomical Institute of the Czech Academy of Sciences and includes the design, development and testing of several software packages. The launch is planned for late 2001.

D. Hard X-ray spectrometer

6. The Hard X-ray Spectrometer (HXRS) is a joint venture of the Astronomical Institute of the Czech Academy of Sciences and the Space Environment Center of the National Oceanic and Atmospheric Administration of the United States. The satellite measurements should demonstrate the feasibility of predicting interplanetary energetic proton events by detecting a specific type of solar flare known to be associated with those events. HXRS was developed and constructed by the Czech company Space Devices. It is scheduled for launch together with the Multispectral Thermal Imager in October 1999. Its expected lifetime is three years, which should encompass the peak years of solar cycle 23. The data received from the experiment will be used simultaneously by Czech astronomers for research on solar flare physics.

III. Earth observation

7. Within the framework of the Phare programme, the digital database has been built up of land-cover units over the entire country on the scale 1:100,000. The Coordination of Information on the Environment (CORINE) methodology was applied, using a visual interpretation of Land Remote Sensing Satellite (Landsat) thematic mapper geocoded images followed by the digitalization of drawn results. In order to cover the whole territory of the Czech Republic, nine images have been used. The database is consistent with similar products elaborated in other European countries. The database is used in various applications such as environment analysis, soil degradation assessment and air pollution modelling.

8. Data from synthetic aperture radar (SAR) on European remote sensing satellites (ERS-1 and ERS-2) have been used for the production of space maps on the scale 1:200,000. Several image maps have been produced for geological and geomorphological analysis. GISAT, a company based in the Czech Republic, has used the data for mapping the geological situation for new oil pipeline construction, for the identification of potential nuclear dump sites and for regional geomorphological analysis. Radar interferometry has also been applied to obtain a grid model description with a spatial resolution of 20 m and an error in elevation of 10-20 m.

9. Several images of the floods in the Czech Republic were obtained using the Canadian satellite RADARSAT in July 1997. The SAR data were obtained thanks to close cooperation with the satellite programming centre. The semi-manual interpretation of the flooded areas carried out by the company GISAT has led to a map of the flooded areas. The map has been used in further studies and analysis of flood phenomena and in planning appropriate protective measures in the areas concerned.

IV. Materials sciences

10. The activities in the field of material sciences have focused mainly on three basic areas of research: (a) theoretical background of materials experiments; (b) development and manufacturing of crystal-growing space facilities; and (c) materials experiments in space. The Czech company BBT Materials Processing developed the first Czech version of fully automatic space crystallizers CSK-1A and B, followed by an improved CSK-1C version and consequently a CSK-4/TITUS furnace. All crystallizers functioned on board the manned Mir space station, including the EUROMIR 94 and EUROMIR 95 missions under the ESA programme, as well as the German MIR 97 and the French MIR 99 missions. The TITUS facility used in the experiments is a fully modular tubular crystallization furnace. At present, BBT Materials Processing is developing (in cooperation with the Microgravity User Support Center of the German Aerospace Center (DLR-MUSC) and with Humboldt University) a new generation of the Advanced TITUS facility for the international space station.

V. Life sciences

11. Research and studies are under way to elaborate a methodological tool for describing the behaviour of space crew members. Several experiments were carried out in the past by the Stress Research Centre of the Czech Air Force, together with Russian and German partners. Staff of the Centre participated in the ESA experiment HUBES in 1994, when a 135-day space flight was simulated in laboratory conditions. A similar experiment was organized in Moscow in 1995. Since 1996, the research has been aimed at the verification of an expert semi-automatic system for the early on-line detection of stress, in cooperation with

the German Institute for Stress Research. The feasibility of the continuous recording of mutual relations during the experiment and the early detection of tensions inside the group has been proved. A new method of dynamic sociometry has been developed based on the interdisciplinary approach combining biology, psychology and sociology.

VI. Industry

12. Today, all recent technologies are available in the Czech Republic without any serious limitations. In the past, when such technologies were not available, the engineers were trained in inventing and problem-solving. That proved to be a big advantage in absorbing technologies after the political changes in 1989 and it naturally led to the identification of optimal and efficient technical solutions. The engineers are involved in space projects that suit their qualifications and specific knowledge of technology. Project management follows western European standards—including ESA standards—and, thus, creates a framework for excellent results. The activities of several Czech space-oriented industrial companies are described below:

A. Space Devices

13. The company Space Devices was established in 1991 as a small private firm specialized in the development and manufacturing of scientific instruments for space research. The founders of the firm profited from their experience in the INTERCOSMOS programme between 1967 and 1990. The leading technicians became specialists contributing to INTERCOSMOS projects such as Vertilal, Prognoz, Vega, Mir, Phobos, Interball and Koronas. While the manufacturing is done by cooperating enterprises under supervision, specialists from Space Devices are responsible for the integration, testing and calibration of instruments.

B. Science Systems (CR)

14. Science Systems (CR) is a Czech company owned by Science Systems Space Ltd. of the United Kingdom of Great Britain and Northern Ireland. Science Systems (CR) provides consultancy and development of software systems for high-tech applications, such as satellite ground control systems and satellite data processing. Recent projects include subsystems for Envisat (the most complex satellite yet to be launched by ESA), testing for a distributed satellite ground segment system and engineering support in the development of the newest ESA satellite control system, which is being provided directly on site in the European Space Operations Centre. The company staff has also participated in the development of the Telemetry Tracking Command Unit for the Spanish satellite HISPASAT, a mission control centre core facility for the Meteosat Transition Programme, the satellite EUROSTAR and the European part of the Iridium project. The company also has working relationships with the National Commission on Space Activities (CONAE) of Argentina and the Instituto Nacional de Pesquisas Especiais (INPE) of Brazil.

C. Czech Space Research Centre (CSRC) Consortium

15. The Czech Space Research Centre (CSRC) Consortium consists of four companies that offer capabilities in electronic design, development and clean-room manufacturing. The lead company CSRC is responsible for task definition, project management and quality assurance. CSRC Manufacturing assembles electronics in its "D" class clean room. The room, which has been certified by ESA, a "100,000" class room with dimensions 6 x 6 x 2.5 m. The design and

development of electronics are the responsibilities of the KB Company. The development of software and computer systems is the responsibility of the ARTISYS Company.

16. The (CSRC) Consortium has developed harness test equipment for testing the perfection of spacecraft harness, electronics for the plastic scintillator anti-coincidence experiment on the INTEGRAL satellite, electronics for testing the charge couple device (CCD) camera designed for the European Photon Imaging Camera (EPIC) experiment on the X-ray Multi-Mirror (XMM) satellite. Other activities include several software modules for the controlling system of the ESA Plasma Wind Tunnel and a technological prototype of the inter-satellite communication board. The latter will make it possible to process signals in different protocols and transmission rates (e.g. between ESA and NASA satellites).

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Abstract of the national paper of the Republic of Korea

I. Overview of recent domestic space activities

1. The Republic of Korea launched its space programme in the early 1990s, somewhat late compared with other developed countries. Currently, the Republic of Korea is operating four satellites: two of them are KOREASATs, geosynchronous orbit communication satellites, and the other two are KITSAT-series micro-satellites. In 1990, three more satellites will be launched, KOMPSAT-1, KOREASAT-3 and KITSAT-3. The national Mid-long Term Space Development Plan envisions the launching of 19 satellites by the year 2015, including 5 communication satellites, 7 multi-purpose satellites and 7 scientific satellites.

II. Space technology applications

A. Earth observation

2. Korea's satellite remote sensing technology is being used increasingly in the field of land development, environment monitoring and weather forecasting and has played a leading role in space development since 1980. There is a wide variety of satellite imagery now available and it is expected in the future to help the user community by linking the application and technical development in governmental research and individual software market activities.

3. The Korea Meteorological Administration, affiliated with the Ministry of Science and Technology, is operating a satellite office, which has sole responsibility for processing satellite data on pressure and temperature, which are provided to users with minimal delay. The current data receiving system for GMS-5 satellites and satellites of the National Oceanic and Atmospheric Administration of the United States of America will be backed up by FY-2b from China, GOMS from the Russian Federation and MTSAT from Japan.

4. Korea's first application of satellite data was an investigation of the geological and structural features of the Korean peninsula, which was related to the EROS programme of the National Aeronautics and Space Administration of the United States in 1972. In 1985, the Ministry of Science and Technology prepared a master plan for the establishment of domestic remote sensing technology. The plan pursued development in three major areas of remote sensing technology. The first area concerns applications of remote sensing technology, while the second involves receiving of remotely sensed data. The third concerns the processing of data by digital computers. In 1986, the Ministry of Science and Technology and many

government institutes conducted an experimental remote sensing programme to examine the applications of satellite data for their own fields. As regards the commercialization of satellite remote sensing, the Republic of Korea is still in the research stage. However, the Government will continuously support the research and technical development of satellite data analysis in environmental protection, disaster prediction, natural resource management and Geographic Information Systems (GIS), including imaging software. For the development of satellite remote sensing, the Republic of Korea is willing to cooperate with other Asian countries through joint research.

B. Satellite communication

5. KOREASAT, which is the Korean communication satellite programme, has opened new horizons for satellite broadcasting and communication on the Korean peninsula. The programme has made it possible to receive high-quality television signals at home by using 45 cm antennas. Some pockets inaccessible to television signals have been eliminated completely. The television signals extend into neighbouring areas, including the Democratic People's Republic of Korea and China.

6. The currently proposed mobile satellite communication system in the Republic of Korea will use low-Earth orbit (LEO) satellites under an altitude of 3,000 km. The advantages of LEO satellite communication are attributed to the low power loss in transmission between satellite and station and the small transmission delay, which make it a suitable candidate for voice transmission. Also, low launch costs, low rain attenuation and low multi-path are additional advantages derived from the LEO system.

7. Tele-education is another important application of satellite broadcasting and the Republic of Korea has witnessed its direct benefits. Since August 1997, the Education Broadcast System has been providing a one-way education service in the beam coverage area of KOREASAT using two digital DBS channels. Korea Telecom has been supplying industry education materials to the 562 telecommunication stations scattered throughout the nation and several consortia of universities have been delivering their academic courses via the KOREASAT communication link.

8. In 1999, the Electronics and Telecommunications Research Institute embarked on the development of new generation satellite-based distance education systems that perform valuable interactivity, such as on-line teaching, off-line multimedia learning, data carousels and video on demand.

9. Hundreds of television signals from many foreign communication satellite networks are being received in the Republic of Korea. The broadcasting services over neighbouring countries should be controlled based on the principle of national sovereignty. The Republic of Korea therefore points out that satellite television signal radiation should be coordinated by appropriate measures among the countries concerned.

C. Navigation and position location

10. Global Positioning Systems (GPS) open a new era of positioning and timing determination for modern civilization. Since the early 1990s, several Korean research institutes, universities and industries have been conducting GPS-related research. Differential GPS, receiver design, combined with GIS, and other GPS applications are their major topics of interest. It had been predicted that GPS-related industries, mostly car navigation, would be prosperous by around 1998. However, because of the current economic difficulties, many Asian countries, including the Republic of Korea, have fallen behind by at least two or three years in the quest to make this forecast a reality.

III. Space science

11. While most Korean people may not fully recognize the benefits of basic space science because of its short history, Korean scientists working in space science-related fields participate actively in the global effort for the peaceful uses of the space environment. Specific topics in space science research include the origin of the universe, the near-Earth environment, monitoring of near-Earth objects and new celestial objects, and space exploration. The Korea Astronomy Observatory, the only government-affiliated institute in the field of space science, plays a major role in the study of the origin of the universe by operating a 1.8-m optical telescope and a 16-m radio telescope. To extend the scope of research, a 5-m class optical telescope and very long baseline interferometer projects are in the planning phase. In research on the near-Earth environment, basic data about space plasma around the Earth and the physics of the upper atmosphere are of special interest because of their practical applications for space development. Sharing the data collected from the near-Earth environment with the international community will be one of the important contributions made by Korean space development. Astronomers in Korea are also extremely interested in near-Earth objects in conjunction with sky survey projects for finding new celestial objects and trying to develop local stations to search for near-Earth objects and to participate in the global network in the future.

IV. Geographic Information Systems

12. A plan for a nationwide "information super-highway" has been developed in the Republic of Korea in order to promote the public use of GIS and other information services, and a national GIS project, which covers technical development, standardization, a national base map and land information and management, has been in progress since 1995. Large-scale national thematic maps have also been prepared on the basis of remote sensing data.

V. Small satellite missions

13. The Satellite Technology Research Center at the Korea Advanced Institute of Science and Technology has been developing micro-satellites for scientific and engineering purposes since 1989. The first micro-satellite, KITSAT-1, with a mass of 50 kg, was launched in August 1992 on the Ariane-IV launcher. The main objective of the KITSAT-1 programme was the acquisition of satellite technology through manpower training. After the success of the KITSAT-1 programme, it took less than one year to develop the next micro-satellite, KITSAT-2, also with a mass of 50 kg, which was launched in September 1993 by Ariane-IV. It is planned to launch the third micro-satellite, KITSAT-3, with a mass of 100 kg, in May 1999. The KITSAT-3 imaging system will provide 15-m ground resolution multi-spectral images. The fourth micro-satellite, KITSAT-4, is currently in the initial development phase. Payloads will be developed through international cooperation.

VI. International cooperation

14. As space applications become more and more dedicated to promoting human welfare, the scale of international cooperation has increased in proportion. This trend is due to the fact that space development is now no longer an activity traditionally limited to a few leading countries, but rather an essential element in the improvement of the quality of human life all

over the world. With the rapid accumulation of satellite technology and the resulting expansion in Korea's space programme, a wide range of international cooperative activities are being implemented by the Republic of Korea and other countries at the regional and global levels. The areas of cooperation include space and Earth science study, satellite manufacturing, satellite communication and remote sensing.

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Abstract of the national paper of Argentina

1. The present document describes the current status of space activities in Argentina, in line with the operations carried out under the five action areas, A-E, defined in the National Space Plan.

A. Ground infrastructure

2. Activities in this action area have included the following:

(a) *Ground station for satellite data acquisition*. The station continued to operate during 1998, receiving data from the Land Remote-Sensing Satellite (Landsat), the European Remote Sensing Satellite (ERS) and the Satellite pour l'observation de la Terre (SPOT) Earth observation satellite of France. It is planned to install a further antenna, 13 metres in diameter, in 1999;

(b) *Ground station for satellite tracking, telemetry and command*. The station successfully carried out mission SAC-A under the National Space Plan;

(c) *New ground station for data acquisition and satellite tracking, telemetry and command*. In 1998, work proceeded on the design and development of a second station to be built in the Province of Tierra del Fuego in the year 2000.

B. Satellite systems

3. Activities have included:

(a) *SAC-C satellite mission*. During 1998, the flight operations of satellite SAC-C were examined and the environmental qualification tests were completed at the National Institute for Space Research (INPE) in Brazil. The satellite's launch is scheduled for December 1999;

(b) *SAC-A satellite mission*. The technology satellite SAC-A has been developed for technological demonstration mission purposes with the specific objectives of gathering experience in the area of satellite mission operations and of testing critical satellite components. SAC-A was placed in orbit on 14 December 1998 from the space shuttle Endeavour and is operating successfully;

(c) *Other missions in the SAC series* have included:

(i) *Central European Satellite for Advanced Research mission*. The aspects dealing with the definition of the mission and its viability phase have been formulated jointly with Spain;

(ii) *SABIA3 mission*. The work relating to phase A, the viability stage, has been commenced on this joint mission with Brazil involving the Argentine-Brazilian Food, Water and Environment Data Satellite SABIA3;

(iii) *Observation and Communications Satellite missions*. The different possibilities have been examined and a mission definition in terms of its technical parameters has been prepared. Meetings have been held with the Italian Space Agency in view of the possibility of combining the SAOCOM mission with the SkyMed-COSMO mission.

C. Information systems

4. Operations in this area are as follows:

(a) *Regional Satellite Data Centre of the National Commission for Space Activities (CONAE)*. During 1998, the Centre continued to maintain national and international Internet links for CONAE and other governmental agencies of the country, providing access to satellite image and related space information databases;

(b) *Telemedicine project*. Development of applications and communications technologies for setting up a pilot scheme. A network has been established with its central node at the Teófilo Tabanera Space Centre, three principal nodes at hospitals in the city of Cordoba, five remote nodes in the interior of the Province and one at the Marambio base in the Antarctic;

(c) *Applications in flood control*. In view of the emergency situation caused by flooding as a result of the El Niño phenomenon, CONAE has implemented a nationwide programme involving the delivery of satellite images to public agencies directly involved. This contribution has made it possible to monitor the flood line, estimate and predict soil moisture levels, monitor the entire area liable to flooding, carry out ground mapping and implement a programme for the generation of a flood valley model in the medium term;

(d) *Applications in non-renewable resources*. In connection with mining operations, CONAE has maintained close links with the Argentine Geological Mining Service and makes satellite images available to its members. For the oil industry, human and equipment resources have been developed in order to process and analyse satellite information. CONAE provides the Military Geographic Institute with satellite images for cartographic updating work on the territory of Argentina;

(e) *Applications in agriculture*. CONAE and the Federation of Grain Harvesting Associations and Centres have developed an agricultural crop information system that incorporates harvest technology and is based on the use of satellite products and climatic and hydrological variables. A pilot agricultural monitoring project involving the use of satellite technology for the purpose of obtaining accurate and updated information on agricultural production in the pilot area of Chilcas, Province of Entre Rios, Argentina;

(f) *Distribution of satellite images and promotion of their applications*. During 1998, the Unit for Satellite Image Distribution and Promotion of Satellite Image Applications was established. More than 800 images have been distributed to public and private organizations.

D. Access to space

5. The National Executive has instructed CONAE to incorporate the item "Means of access to space and launch services" into the National Space Plan on an equal basis with the generation of complete space information cycles. This has been achieved by making relevant amendments to the "Access to space" action area, in conformity with the current national and global technological situation and in line with Argentina's foreign policy, its non-proliferation policy and the international undertakings assumed by it in this connection, and by encouraging a gradual and continuous increase in the country's intellectual and technological participation.

6. In late 1998, the firm Veng S.A. was set up with the aim of developing new-generation space vehicles through unconventional mechanisms of financing by the private sector and scientific and technological bodies.

E. Institutional development and basic operations

7. Activities have included the following:

(a) *Scientific activities*

(i) Selection of the second group of Argentine experiments to be carried on board the mission STS-101 space shuttle. The participants in this project are primary and secondary schools and universities of the federal capital and several provinces;

(ii) Continuation of the Total Ozone Mapping Spectrometer Earth Probe programme for ozone measuring from satellites, in cooperation with the National Aeronautics and Space Administration (NASA) of the United States of America and the National University of Rosario; development of operations for irradiation measuring and evaluation of solar risk factors;

(iii) Continuation of the ChagaSpace project, involving the search for drugs to combat Chagas' disease, in cooperation with NASA, the National Institute of Parasitology and research institutes in Brazil, Chile, Costa Rica, Mexico and Uruguay;

(iv) In September 1998 an opportunity announcement was made for the use of data from Argentine instruments on board satellite SAC-C and over 80 proposals from Argentina and several neighbouring countries have been received and approved;

(b) *Institutional links*. CONAE provides support to the National Executive on specific topics, such as the Missile Control System and the National System of War Material and Sensitive Imports and Exports. As the authority responsible for administering the National Registry of Objects Launched into Outer Space, CONAE recorded the entry relating to satellite SAC-A in 1998;

(c) *Cooperation with national institutions*. The execution of the National Space Plan involves the participation of various Argentine scientific, technological and industrial bodies. A number of framework agreements have been signed, six of which were implemented in 1998;

(d) Organization of scientific meetings. Meeting on the evaluation of natural disasters, in particular flooding, based on satellite images (Buenos Aires); Argentine Remote Sensing Symposium, 1998 (Buenos Aires); Second Remote Sensing Education Symposium (Luján), with the support of the University of Luján; Second Latin American Radar Remote Sensing Symposium (Santos), in collaboration with INPE; National Seminar GlobeSar2 on the use of radar images, in collaboration with the Canadian Centre for Remote Sensing; Entre Ríos

International Course in Remote Sensing Applications, with the support of the University of Entre Ríos and the German Aerospace Centre (DLR);

(e) *International cooperation*

(i) *Germany*. Work has continued on the telemedicine programme, which includes the Argonauta project, which is financed in part by the European Community, and the Agricultural Applications project in Entre Ríos, both in cooperation with DLR;

(ii) *Brazil*. Three specific cooperation agreements have been signed with the Brazilian Space Agency: (a) development of satellite SABIA3; (b) launch of a sounding rocket from Brazil with an Argentine payload; and (c) harmonization of ground systems operations on space missions;

(iii) *Canada*. CONAE has continued to serve as coordinator of the Argentine groups participating in the GlobeSar2 programme sponsored by Canada;

(iv) *Spain*. A joint declaration on cooperation in space science and technology has been signed with the National Institute for Aerospace Technology of Spain;

(v) *United States of America*. Work relating to the SAC-C project is continuing with NASA. Satellite SAC-A was placed in orbit by the space shuttle Endeavour. In October, the space shuttle Discovery launched into space experiments of primary and secondary school pupils under the Germinar education project of CONAE;

(vi) *France*. An agreement has been signed with the Centre national d'études spatiales of France for the provision of the Icare instrument to be installed on satellite SAC-C for the mission's scientific purposes;

(vii) Italy: An agreement has been signed with the Italian Space Agency for the provision by Italy of the instruments and solar panel mechanisms for the SAC-C mission.

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Abstract of the national paper of Israel

1. The Israel Space Agency (ISA) was established in 1983 as a governmental organization within the framework of the Ministry of Science and Technology. The Agency has been charged with the role of furthering space-related activities in Israel. In the following years its activity expanded considerably. Israel officially entered the space age in 1988, with the successful launch of the OFEQ-1 satellite.

2. OFEQ-1, 2 and 3 and the SHAVIT launcher that propelled them into space were developed in Israel based on new technologies and are already focal points for future international cooperation. On the basis of these satellites, Israel Aircraft Industries plans, together with a company from the United States of America, Core Software to develop, manufacture and launch eight commercial Earth Remote Observation System (EROS) satellites. The first such satellite will be launched at the end of 1999.

3. On 16 May 1996, the Israeli geostationary satellite AMOS, with nine transponders and beams over the Middle-East and eastern Europe, was successfully launched on an ARIANE-4 launcher.

4. The emphasis continues to be on building and infrastructure geared to achieving optimal economic outcomes by making use of Israel's technological advantages in selected niches, notably small satellites and remote sensing.

5. Other major areas of activity in space are:

(a) Remote sensing. The promotion of remote sensing satellites and the development of applications by users in Israel have a high priority on the ISA agenda;

(b) Automatic generation of digital elevation models using satellite pour l'observation de la Terre (Spot) imagery;

(c) Mapping of the geology, geomorphology and the risks related to active faults and associated seismic activities in the Jordan Rift Valley;

(d) Remote sensing study of the dynamics of vegetation cover as indicators of soil and land use conditions, as, for example, for the prediction of soil salination using cotton field colours as indicators;

(e) Measurement of soil moisture by synthetic aperture radar in the Negev Desert and the Middle East;

(f) National database for digital satellite imagery;

(g) Utilization of global positioning systems for research on the movement of tectonic plates in the region;

(h) The 48-kg micro-satellite Techsat-1a, built by the Israel Institute of Technology (Technion) and carrying several scientific payloads, was launched successfully in July 1998 by a Russian Zenith launcher. A small receiving station was also established at the Technion for control and communication with the satellite;

(i) Tauvex. This ultra-violet telescope is being built by EL-OP under the scientific supervision of the Department of Physics and Astronomy of Tel Aviv University. The telescope will be flown on the Russian Federation International SRG satellite as part of a multinational experiment. Although the launching was planned for 1994, it will take place only in 2000, owing to financial difficulties of the Russian Space Agency;

(j) ISA is involved in a scientific project with the Netherlands to build the Sloshat satellite, which is designed to investigate the "sloshing" problem in satellite fuel tanks. The satellite, which will be launched from a space shuttle of the National Aeronautics and Space Administration (NASA) of the United States in late 1999, will be equipped with an Israeli thruster system;

(k) ISA is funding an electrical thruster development project and also a small laboratory that inspects every component and subsystem before launch to see if it will survive the environmentally hostile conditions of space. The laboratory cooperates with the Centre national d'études spatiales (CNES) of France;

(l) ISA has initiated a feasibility study, being carried out by the Israeli company EL-OP and the German companies OHB and GAF, regarding the possibility of developing a small sophisticated commercial remote sensing satellite, David, based on a major spin-off of the Tauvex telescope. The first stage of the David programme is supported by the European Union and by ISA;

(m) A ground receiving station for satellite images was established on the grounds of Israel Aircraft Industries where the images of the French Spot satellite, the European ERS and OFEQ are received on a regular basis;

(n) At present, the scientific Mediterranean-Israeli Dust Experiment (MEIDEX) is in preparation. The MEIDEX payload will be launched on a NASA space shuttle accompanied by an Israeli astronaut (payload specialist);

(o) ISA is establishing, together with Israeli universities, an Earth Observation System Data and Information System (EOSDIS) node within the framework of a cooperation agreement between NASA and ISA. The EOSDIS node will become operational in 1999;

(p) International cooperation. ISA has officially signed cooperation agreements with NASA, CNES and the German Aerospace Center (DLR), and has a memorandum of understanding with the Russian Space Agency.

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Abstract of the national paper of Morocco

1. Morocco, aware of the spin-off benefits of space technologies in the economic and social spheres, has instituted a dynamic, realistic and sustainable policy for their inclusion in its development projects. As a result of high-level political commitment, Morocco has built up its human resources and a body of users, in particular in the fields of telecommunications, Earth observation and space meteorology.

2. Since the 1970s, Morocco has been integrating those technologies into its development programmes. In the field of space telecommunications, Morocco operates several regional satellite programmes and has signed a number of agreements with international organizations in order to strengthen its national capabilities in the areas of information exchange, data transfer and communication, with a view to focusing decision-making in a number of sectors and to meeting the country's priority needs with regard to natural resource management, environmental protection and land-use planning. The establishment of the Royal Centre for Spaceborne Remote Sensing (CRTS) in 1989 has contributed to the development of integrated projects and operational applications through the coordination of the efforts of all national partners, the installation of infrastructures tailored to requirements (in particular for data and information access) and the establishment of an exchange and cooperation network with partners abroad.

3. Morocco is pursuing its policy of raising awareness and promoting the expansion of space applications to other fields (space technologies, space sciences, etc.) by intensifying cooperation programmes and training activities. Seminars, exhibitions and symposia are regularly organized to make policy and decision makers, scientists and young people aware of the actual and potential contributions of remote sensing and space science and technology. In this connection, a National Remote Sensing Committee has been set up to coordinate the activities of the various ministerial departments. This Committee produces a newsletter on space-related activities. In addition, CRTS publishes *Géo Observateur*, a scientific journal that reports on the results of research and other work carried out in developing countries using satellite data and geographic information systems.

4. In the area of training, Morocco's Mohammadia Engineering School houses the African Regional Centre for Space Science and Technology—in French language, whose first training programme will begin in late 1999. Morocco will also have a centre for continuing training and skill-upgrading in advanced technologies within CRTS. This centre, which is being provided with purpose-built facilities (classrooms, practical workrooms, documentation sections and lecture halls equipped for interactive distance learning), is geared to the requirements of the countries in the region.

5. As part of its international policy, Morocco is actively seeking to develop its international cooperation in the fields of space science and technology. It is conducting various activities with the aim of extending its network and strengthening its North-South and South-South bilateral and multilateral cooperation.

6. At the regional level, Morocco is participating actively in the formulation and implementation of regional projects, in particular in the regions of Mediterranean Europe, Africa and the Middle East. Having organized the International Space Year Conferences for Africa in 1992 and 1995 on the use of remote sensing by satellite in support of the environment and development in the Africa-Middle East region in collaboration with space agencies and regional and international organizations, Morocco will shortly be organizing the third International Space Year Conference for the area, the aim of which is to enhance information- and experience-sharing between the countries of the region. It has also hosted several events in cooperation with regional and international organizations (Food and Agriculture Organization of the United Nations, European Association for the International Space Year (EURISY), etc.).

7. Morocco also accords particular importance to the execution of the United Nations Programme on Space Applications. Since 1961, it has been a member of the Committee on the Peaceful Uses of Outer Space. Morocco has been playing an active role in the work of the Committee and its subsidiary bodies since 1992 and has provided the Committee's Vice-Chairman/Rapporteur since June 1997. In addition, Morocco has ratified four of the five treaties governing the use of outer space. Its accession to the Convention on Registration of Objects Launched into Outer Space is currently under examination by the relevant governmental bodies and specialized institutions.

8. Morocco has contributed actively to the preparations for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III), has hosted the Regional Preparatory Conference for UNISPACE III for Africa and the Middle East and reaffirms its commitment to implementing the recommendations of the Conference.

9. All these activities, in addition to its dynamic participation in several other regional and international associations and committees which are active in the field of outer space (the Space Agency Forum, EURISY, the International Astronautical Federation, the International Space University, the Arab League Educational, Scientific and Cultural Organization, etc.), indicate the importance that it attaches to cooperation for the development of the peaceful uses of outer space to the benefit of all nations.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Finland

1. Space plays an increasingly important role in Finnish society. Satellites and space-related methods are used as a tool for improving scientific knowledge, increasing the effectiveness of public sector services and developing new businesses.

2. Space activities are a part of Finland's overall science and technology policy. The research and development activities in the field of space contribute to an overall increase in scientific and technological expertise and know-how in Finland. In terms of industrial and technological development, space activities are expected to increase the technological competitiveness and diversification of Finnish industry. The exploitation of space-based applications, such as remote sensing, telecommunications and navigation has an increasingly important socio-economic impact, in addition to the prospects of generating new business based on space applications and services.

3. Space administration and funding matters in Finland are run in a decentralized fashion involving mainly the Technology Development Centre and the Academy of Finland, with the Finnish Space Committee acting as the overall coordinating body. The Committee, established in 1985, comprises representation from several key ministries as well as from industry, science and research, and from users of space applications.

4. Finland has been a full member of the European Space Agency (ESA) since 1995 and ESA forms the main international forum for Finnish space research and development activities. At present Finland participates in the ESA science, telecommunications and Earth observation programmes and the related technology research and development programmes. Moreover, in the field of space applications, Finland belongs to the European Organization for the Exploitation of Meteorological Satellites, the European Telecommunications Satellite Organization, the International Telecommunications Satellite Organization and the International Mobile Satellite Organization.

National objectives of space activities

5. At the request of the Council of State, the Finnish Space Committee revised the Finnish national strategy, which was published in March 1999[1] and is based on the following main national objectives:

[1] "Space Activities in Finland: National Strategy and Objectives", Ministry of Trade and Industry standing committee reports 1/1999 (ISBN 951-739-435-7).

(a) The internationally high level of Finnish space science will be maintained by participating in the key international collaborative scientific projects;

(b) The use of the emerging new methods of satellite remote sensing will be extended in the data collection and geographic information systems in the public sector. Commercialization will be further stimulated by increasing the outsourcing of the public sector services;

(c) Industrial competitiveness will be strengthened in the growth areas of satellite telecommunication;

(d) The development of new navigation and positioning applications will be stimulated. Participation in the GNSS-2 satellite navigation system development programme will be pursued;

(e) The competitiveness of the space industry will be strengthened with a view to expansion to markets outside the ESA area;

(f) In international research cooperation the emphasis will be on ESA and European Union (EU) programmes and on bilateral research activities with ESA and EU member States and the United States of America;

(g) National activities will support the expansion of the use of space technology and its applications, strengthening of technological competitiveness and utilization of international cooperative frameworks.

6. In view of the above national objectives, the estimated requirements for public funding of space activities, in millions of United States dollars, are as follows:

Year	*1998*	*1999*	*2005*[a]
Space science	9.5	9.6	12.9
Remote sensing	18.3	18.5	19.7
Satellite telecommunication	2.5	1.6	1.6
Satellite navigation and positioning	2.2	2.9	7.2
Space equipment and technology	7.2	7.2	7.7
European Space Agency fees	2.3	2.3	3.6
National regulation and administration	0.7	0.7	0.7
Total	**42.7**	**42.8**	**53.4**

[a]Estimates.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Indonesia

1. Since the 1960s, progress in space technology and its applications has proved to be of great benefit to the achievement of the national development objectives of many countries. The great benefits continue to grow as a result of the ever-increasing space activities by countries, including developing countries. It is strongly believed that the progress of space technology and its applications could make a significant contribution to the prosperous, peaceful and stable world desired by all countries.

2. In line with the above desire, countries are obliged to cooperate with each other concerning the pattern of space activities in the future. In other words, cooperation among countries in space technology and its applications is an imperative rather than an option. To that end, all countries, in particular developing countries, should have broad access to such cooperation and such access will be valuable only when the developing countries have the requisite indigenous capabilities, in terms of both technology and related human resources, to participate significantly in the cooperative activities.

3. Cooperation under the auspices of the United Nations system or other systems has been taking place for some years. However, it is felt that the pattern and methods of carrying out such cooperation, especially the process of transfer of technology, have not yet given rise to much technological capability and related human resource development in most developing countries, which are required to undertake self-sustaining and ever-increasing space activities by themselves. A new progressive paradigm for such cooperation should therefore be defined, especially in facing the challenges of the twenty-first century. The paradigm should progressively introduce new concepts and methods of establishing space cooperation. Those ideas and methods should be based on countries' awareness of their responsibility to ensure that space cooperation is aimed at providing benefits for all cooperating countries. In that cooperation the comparative and competitive advantages of each participating country should be utilized. With such a new progressive paradigm, space cooperation should bring about concrete benefits, that is, development of in-country space technology and related human resources in all participating countries.

4. Based on the above and taking into account the interests of all countries, Indonesia is of the considered view that all countries should conduct their space activities in the spirit of the following basic principles: (a) all countries should have access to information on the progress and development of space technology and its applications; (b) international cooperation allowing for the development of in-country space technology and related human resources, as well as international economic and industrial cooperation in a "win-win" scheme should be promoted; (c) industrialization and commercialization of space technology and its

applications by industrial and developing countries alike as partners in a mutually beneficial cooperation should be carried out; and (d) international space treaties and/or conventions functioning as cornerstones in increasing and encouraging more international space cooperation, addressing pressing space issues and safeguarding the interests of all countries taking into account the special needs of developing countries should be negotiated.

5. These four basic principles should be observed in space cooperation, especially in addressing the Earth-bound problems of great concern to all countries, in particular developing countries. Those problems include, among others, poverty, inadequate food security, lack of public facilities, lack of teachers, low public health, environmental degradation, lack of capability in assessing natural resources and inadequate space information systems.

6. As to Indonesia's space activities, Indonesia has given its space programme high priority in its national development programme. In the country, the National Council for Aeronautics and Space of the Republic of Indonesia (DEPANRI) functions as the highest national coordination and policy formulation forum for national aerospace development. This Council, chaired by the President of Indonesia, consists of eight related ministries as members and the Chairman of the National Institute of Aeronautics and Space (LAPAN) as Secretary of the Council. The Council's activities are aimed primarily at developing applications of space technology. Space technology and space science activities focus on supporting space applications and industrial activities. For telecommunication services, the country at present operates five domestic satellites: two satellites of the PALAPA-B series, two satellites of the PALAPA-C series and Indostar-1 (also known as Cakrawarta-1). Indonesia has been operating a ground station for remote sensing applications at Parepare, in south Sulawesi, which has been receiving data from various remote sensing satellites. Many agencies have installed data processing facilities catering for their needs as regards remote sensing applications. Indonesia operates its meteorological satellite ground receiving stations to acquire both geostationary meteorological satellite data and data from the National Oceanic and Atmospheric Administration of the United States of America. Over time, data have been applied for non-meteorological purposes such as applications in forest fire detection and monitoring, drought monitoring, crop assessment, mapping of sea surface temperature, monitoring of the movement of the inter-tropical convergence zone and the development of a model for prediction of El Niño Southern Oscillation events and their impact on crop production and flooding. Space technology development focuses on the indigenous design and development of systems and/or subsystems. Space research programmes encompass activities related to climate and air pollution, the middle and upper atmosphere and the solar system. Now Indonesia is looking very seriously into developing a climate prediction model for the entire area of the country. Regional and international cooperation in space activities are considered of high importance to speed up the process of technological capability and human resource development as well as to promote the peaceful uses of outer space. Indonesia has cooperated with many countries and also participated actively in subregional, regional and international events. In the future, the space programmes in the country will still focus on space applications. Nevertheless, Indonesia will increase its efforts in developing space technology in order to achieve self-sustaining capability in overall space activities. Indonesia is now conducting a study on the possibility of developing its own aeronautical navigation satellite system.

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Abstract of the national paper of Belarus

On the current status and development prospects of space activity in Belarus

1. Increasing activity in space-related fields and the integration of an ever larger number of States within the space community have emerged as steady trends throughout the world.

2. Space exploration and applications are promoting the development of new advanced technologies and the achievement of improved effectiveness and progress in various areas of industry, agriculture, transport, energy, communications and many other vital spheres of activity.

3. The participation by Belarus in numerous space programmes of the former Union of Soviet Socialist Republics acted as a powerful stimulus to the development of its national scientific-industrial sector.

4. With a view to implementation of those programmes in Belarus, new factories were built, project entities and specialized production lines were established, specially designed equipment was purchased, manufactured and brought into operation, modern techniques for the manufacture of space technology were introduced and collectives were formed of highly qualified scientists, engineers and technicians (from the Institute of Engineering Cybernetics, the Institute of Physics, the Institute of Electronics and the Institute of Heat and Mass Transfer of the National Academy of Sciences of Belarus (NASB), the Scientific Research Institute of Applied Physics of Belarus State University, the Belarusian Optical and Mechanical Consortium and its Peleng Central Design Bureau, the Kamerton Special Design Bureau, the Tsentr Research and Production Consortium, the Izmeritel ("Measure") and Sputnik plants, and many other entities).

5. Since 1991, when Belarus became a sovereign State, scientific and technological work in space-related fields has been financed from national budgetary funds and from orders placed by the Russian Federation.

6. The report provides extensive information on the projects implemented in Belarus in space-related fields.

V.99-84271 (E)

7. Among those projects, the Institute of Physics of NASB has designed a series of instruments (MSS-2, MSS-2MB, MSS-2P, SKIF, etc.) that have been used to investigate the spectral and polarization characteristics of radiation scattered by the atmosphere and the Earth's surface. Special methods have also been devised for calculating the influence of the atmosphere in the processing of remote sensing data.

8. The NASB Institute of Engineering Cybernetics was the lead organization in the former Soviet Union for the design of systems, complexes and methods for digital geographical mapping based on satellite data and other cartographic materials. The development of that field has allowed the Institute to continue its work in the area of establishing geoinformation systems.

9. The NASB Institute of Electronics, together with its Ekon Design Bureau and cooperation with Russian organizations, has designed, manufactured and brought into operation the SFM-2 instrument for measuring the vertical section of the Earth's ozone layer in four spectral ranges. SFM-2 instruments were used on METEOR satellites in conjunction with instruments from the United States of America (Meteor-TOMS programme) during the period 1985-1994. The SFM-2 design has recently been modernized for operation on Meteor-3M satellites. Work is also in progress on the design of the SFOR-1 satellite instrument for global monitoring of the Earth's ozone layer and other gaseous constituents with simultaneous mapping of the ozone fields at heights of up to 70 km, together with determination of their vertical profiles. Measurements are being carried out in eight spectral ranges.

10. The A. V. Lykov Institute of Heat and Mass Transfer, an academic scientific complex within NASB, is a leading institution in the field of plasma technology. The powerful Hall accelerator designed by the Institute in collaboration with Russian organizations is used for modelling aerodynamic heating during the flight of space objects in the Earth's atmosphere and in the atmosphere of other planets under conditions closely simulating natural conditions.

11. At the Peleng division of the Belarusian Optical and Mechanical Consortium, the multizonal MK-4M satellite camera installed on the Resurs series of satellites, providing multizonal photographic images of the Earth's surface in four ranges of the optical spectrum, is currently being upgraded. Recently, a new multizonal satellite camera, the Gemma model, has been under development. This camera applies the international standard for photographic images with frame dimensions of 230 x 230 mm, an enlarged photographed area of the Earth's surface, improved resolution and an envisaged automatic exchange between up to 12 spectral zones; in addition, the camera offers automatic exposure regulation and adjustment to take account of cloud cover and other conditions at the time of photography.

12. At Belarus State University, the VFS-3M orbital videophotometric system has been designed for investigating optical radiance in the Earth's atmosphere and ionosphere caused by lightning activity and related to seismic processes. A number of other organizations are involved in the development of methods and systems for processing space information.

13. The development work presented in the report provides evidence of the great scientific and technological potential of Belarus.

14. Belarusian interests in the uses of space and the applications of space technologies encompass a broad spectrum of topics related to the country's national economy. Chief among these are the following:

(a) Use of remote sensing data for the conservation of agricultural, forestry and water resources and for reclamation purposes;

(b) Ecological and radiation monitoring;

(c) Disaster analysis and preparation of aids to decision-making for purposes of disaster prevention or management;

(d) Investigation of natural resources and exploration of mineral resources;

(e) Revision of topographical maps on the basis of satellite images from the Global Navigation Satellite System (GLONASS) and the NAVSTAR Global Positioning System;

(f) Hydrometeorology;

(g) Communications, television broadcasting and satellite navigation;

(h) Use of space technologies for the production of semiconductor materials and their use in the electronics industry and the production of bioactive substances for the pharmaceuticals industry;

(i) Development, manufacture and sale to other States of remote sensing satellite equipment, ground systems for digital processing of space data, optoelectronic systems and rocket trajectory measurement systems, navigational systems and other space instruments and systems developed and manufactured in Belarus in the space sector.

15. International cooperation is crucial to meeting the challenges presented in each of these areas.

16. In order to coordinate work in space-related fields and to ensure cooperation with space agencies in other States and with other international organizations in areas of space activity, a new entity, the National Space Council, has been established in Belarus.

17. The report also provides information on inter-state agreements concluded by Belarus in connection with the exploration and uses of space and on Belarusian participation in international scientific and technological programmes in the field of outer space.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Brazil

I. General

1. Brazil was one of the first developing countries to institutionalize space activities, with the creation of space-oriented government organizations in the early 1960s. The origins of the National Institute for Space Research (INPE) date back to 1961, resulting from a common initiative of a group of civilian scientists and the Ministry of Aeronautics. Similarly, the origins of the Institute of Aeronautics and Space (IAE) go back to 1966 and the Barreira do Inferno Launch Centre, in the north-eastern state of Rio Grande do Norte, was inaugurated in 1965, both under the Ministry of Aeronautics. The coordination of the government organizations specializing in space activities was first established in 1971, with the setting up of the Brazilian Commission on Space Activities (COBAE), an inter-ministerial office.

2. From their early stages, Brazilian space activities have been motivated by peaceful purposes and the civilian character of the Brazilian programme has been formally emphasized in recent years. A major factor in that direction was the creation in 1994 of the Brazilian Space Agency (AEB), a civilian governmental organization under the Presidency of the Republic, replacing COBAE. Another important event was the country's admission to the Missile Technology Control Regime in 1995, clear evidence of Brazil's positive and constructive commitment to non-proliferation.

II. The present institutional framework

3. AEB, currently under the supervision of the Minister for Special Projects, acts as central coordinator of the National System for the Development of Space Activities (SINDAE). The Agency has the legal mandate to formulate national policy for the development of space activities and to formulate and implement the national space activities programme, whose major elements are presently carried out by other government organizations taking part in SINDAE.

4. INPE, under the Ministry of Science and Technology and with its headquarters located in São José dos Campos, in the south-eastern State of São Paulo, is in charge of projects devoted to the development of satellites and related technologies, as well as research and development in the fields of space sciences, including aeronomy, astrophysics and space geophysics, and space applications, in particular remote sensing, oceanography, meteorology and global change research.

5. IAE, also located in São José dos Campos, is responsible for the development of satelli launchers and sounding rockets. Additionally, the Ministry of Aeronautics is responsible f the development of a fully operational launch range at the Alcântara Launch Centre, in t northern state of Maranhão, and for running the Barreira do Inferno Launch Centre addition, the Ministry has assigned to Infraero, a state company under its supervision, the ro of promoting the commercial use of the Alcântara Launch Centre.

6. Brazilian universities and the private sector also take part in SINDAE. The universiti are becoming increasingly involved in basic research and technological developme activities, whereas the private sector has been engaged in the development of system equipment and services.

A. National policy for the development of space activities

7. Brazilian space policy—sanctioned by the President of the Republic December 1994—establishes major principles, objectives and guidelines for national spa activities. The major goal of those activities is defined as to foster the country's capacity utilize space resources and techniques—according to Brazilian preferences and criteria—order to solve national problems for the benefit of Brazilian society.

B. National space activities programme

8. The Brazilian space programme establishes initiatives to be pursued in order to achie the objectives identified in the national policy, consistent with its principles and guidelin The programme covers a 10-year period and is subject to periodic review. The current versi applies from 1998 to 2007 and is organized in seven major programmes, namely, spa applications, satellites and payloads, launch vehicles, space-related infrastructure, research a development, establishment and further training of human resources and development national industrial capability. The main objectives of the programme may be summarized follows:

(a) To develop and support space applications in areas of remote sensin meteorology, oceanography, communication, navigation and geodesy, with a view to solvi national problems;

(b) To perform research and development in the fields of space and atmospher sciences, focusing mainly on phenomena of global concern or of particular interest to Braz

(c) To establish and maintain capability for design and construction of soundi rockets and satellite launching vehicles that meet the requirements of the country's spa programme and of the international market;

(d) To establish and maintain the infrastructure required by science, application a system development programmes, including launch centres;

(e) To foster the Brazilian private sector's participation and competitiveness in t market for space goods and services.

9. Among the important achievements of the Brazilian space programme, besides tho mentioned below in the context of international cooperation initiatives, the following deser special mention: the development and successful launching of two data-collecting satellite in 1993 and 1998, both still in good working condition; the development of a very successf family of sounding rockets, named Sonda, and of a small satellite-launching vehicle, t VLS-1, at present at the stage of flight qualification; the building of the Alcântara Laun Centre, currently being prepared to offer satellite-launching services on the internatio market; the pioneer research, the first ever in South America, on the equatorial ionosphe

plasma anomaly, which may have a drastic effect on telecommunications, as well as on the depletion of the ozone layer, whose adverse consequences are well known; and the systematic use of remote sensing imagery to estimate the rate of deforestation in the Amazon region.

III. International cooperation

10. International cooperation has played a key role in the planning and implementation of Brazilian space activities. Starting in the early 1960s, when the Government of Brazil began the consolidation of the institutional structures in the space field, several "space-faring" countries, including some of the major ones, initiated a very fruitful and lasting partnership with Brazil. Since the establishment of AEB in 1994 and consistent with the orientation of its space policy, which recognized the international trends towards the enhancement and expansion of space cooperation, as well as the beneficial integrative potential of those initiatives, the Government has signed five framework agreements on space cooperation for peaceful purposes, with China (November 1994), the United States of America (March 1996), Argentina (April 1996), the Russian Federation (November 1997) and France (November 1997). A similar agreement is about to be signed with the Government of Ukraine.

11. Space cooperation with China dates back to the 1980s and is centred on the development and manufacturing of two remote-sensing satellites, the China-Brazil Earth Resources Satellites (CBERS), designed for global coverage using optical visible and infrared cameras. CBERS-1 is due to be launched in the current year.

12. As a result of an implementing agreement with the United States, Brazil has joined the International Space Station programme. The Brazilian contribution will include the development and provision of flight equipment and payloads and, as part of the preparation for the ISS programme, a Brazilian astronaut-candidate is now being trained by the National Aeronautics and Space Administration (NASA) of the United States. Cooperation with the United States also includes the development of a humidity sensor that will be part of the payload of NASA's EOS-PM1 satellite, as a part of the Earth observation system programme. Furthermore, a Brazilian charge coupled device remote-sensing camera is scheduled for experimental flights on board the Space Shuttle.

13. France, Germany and the Russian Federation have also been traditional partners of Brazil in the space area. Recently, AEB and the Centre national d'études spatiales of France have signed and are implementing two agreements for the development of a propulsion system for mini-satellites and for the joint development of a micro-satellite to be launched by the Brazilian launching vehicle VLS-1. In addition, technical working groups of both agencies, under the institutional framework of a common strategic group, are trying to identify further opportunities for cooperation, including common interests in the development of a new low-Earth orbit satellite launch vehicle.

14. The cooperation with Latin American countries has been pursued by several means, including training courses, especially on remote sensing, and the provision of remote data-collecting platforms to be used in connection with the Brazilian data-collection satellite. In the case of Argentina, the relationship was strengthened through the signature in 1998 of four programmes of cooperation, notably the preliminary studies on the development of the Argentine-Brazilian Satellite for Information on Food, Water and Environment (SABIA), designed to cover the entire region of the Southern Common Market (MERCOSUR).

15. Brazil has also participated effectively in the works of the Committee on the Peaceful Uses of Outer Space, acting as rapporteur from its creation in 1959 until 1997. In the spirit of contributing to the objectives of the United Nations Programme on Space Applications, in

1997 Brazil and Mexico signed an agreement for the establishment of the Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, to be affiliated to the United Nations. The Brazilian site of the Regional Centre is already established on the main campus of INPE and is expected to be fully operational before the end of 1999.

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Abstract of the national paper of Jordan

1. In Jordan, activities relating to the peaceful uses of outer space are limited to three major fields: telecommunications, meteorology and remote sensing.

2. Advances in telecommunications go back to 1971, when the first satellite receiving station was established at Baq'a, to the north of Amman. As a result of several modernization projects implemented during the period 1971-1995, the Baq'a complex now has three satellite receiving stations ensuring traffic through 1,584 channels to about 52 destinations worldwide.

3. Motivated by political will at the highest level, the private sector in Jordan has been actively involved in introducing and promoting mobile phone and Internet services in Jordan. As a result of the current trend towards lowering the initial and running costs of those services, they will soon become affordable to a broad segment of the population in Jordan.

4. To catch up with the developments in using satellite meteorology techniques, the Department of Meteorology has acquired several systems for receiving cloud images and climate data and exchanging information with other national meteorological centres.

5. Remote sensing techniques were introduced in 1989 when an integrated image-processing unit was established in the Royal Jordanian Geographic Centre. The successful applications include updating maps, thematic mapping and conducting studies related to agricultural, water and environmental applications.

6. Parallel to the developments involving applications, significant progress has been made in the areas of education and training. Elements of space science and applications were introduced in schools at the primary and secondary levels. At the university level, remote sensing courses are now an integral part of agriculture, environment and earth science programmes. In addition, some Jordanian universities have recently started undergraduate and graduate programmes in space applications. Such programmes cover topics in space geodesy, remote sensing and space telecommunications.

7. In addition, specialized training courses focusing on the practical aspects of space technology applications are provided by many universities and specialized training centres.

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Abstract of the national paper of the United States of America

1. The present paper provides an overview of recent accomplishments and activities of the United States of America in space in three major sectors, civil, national security and commercial. United States space activities are contributing to international scientific understanding, global security and economic growth. Highlights include activities related to the International Space Station, understanding the Earth's environment, exploring the solar system and the universe and developing new space technologies.

2. Since the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE II) in 1982, there have been great technological advances, especially in the management and communication of information. International conditions have also undergone great change, with the end of the cold war creating new opportunities for space cooperation. International space activities are being conducted by both public and private sector organizations as a result of globalization and commercial space activities. Revenues from space commerce have been growing rapidly, driven by demand for global information services. Commercial revenues now exceed spending by Governments on space activity.

3. The United States has restructured and streamlined its public sector activities in recent years. The National Aeronautics and Space Administration (NASA) is a transformed agency compared with even six years ago: its focus is now on smaller, faster, cheaper missions offering more frequent opportunities for international cooperation. The Agency is now sized and organized to focus more on technology development activities while pursuing ways to privatize and commercialize its major operations in the future.

4. A significant trend for the United States is efforts by the Department of Defense and NASA to expand their relationships with industry beyond those of traditional contractors, to relations more like partnerships. This is intended to result in the commercial sector having both more control over United States space activities as well as increased funding responsibilities. Some candidate areas for new partnerships include the X-33, the Evolved Expendable Launch Vehicle, launch range modernization and NASA's Shuttle Flight Operations Contract. In space transportation, the United States has continued successful operation and improvement of the Space Shuttle (improving its safety, performance, cost and operability). The United States commercial space launch industry has matured and grown more complex, including the creation of international joint ventures. United States government agencies now routinely buy commercial launch services.

V.99-84040 (E)

5. As United Nations Member States look to the future, the challenges and opportunities created by space activities are great. In particular, plans for future space activities are being shaped by new information technologies, globalization and the increasing importance of private sector activities. Emerging commercial space systems and applications show particular promise in benefits to developing countries. Precise position location, navigation and timing are available free of charge to users anywhere in the world as a result of the Global Positioning System. Commercial mobile satellite services will provide data, voice and even Internet connections anywhere in the world, creating "instant infrastructure" in regions now lacking adequate telecommunications.

6. In order for space exploration and development to benefit all United Nations Member States more effectively, greater international cooperation will be needed, not only on specific projects such as environmental monitoring and protection, but also in ensuring that international regulatory structures encourage commercial space activities in ways that are predictable, transparent and effective.

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Abstract of the national paper of Nigeria

I. Background

1. Early space science and technology-related work in Nigeria included the gaining of an understanding of the structure of lightning discharges in general and of tropical thunderstorms in particular, geomagnetism, the equatorial electrojet and the equatorial ionosphere. Research in those areas was carried out at the Department of Physics, University of Ibadan. At the Obafemi Awolowo University, Ile-Ife, research work is continuing in atmospheric physics, with emphasis on radio propagation associated with satellite communications in the tropical environment. The University of Nigeria, Nsukka, contributed to the discovery of pulsars (pulsating radio stars from space) during the period 1964-1965. At present it has an active radio astronomy programme.

2. Satellite meteorology programmes are the specialities of both the Obafemi Awolowo University and the Federal University of Technology at Minna. The establishment of the National Centre for Remote Sensing in Jos has fuelled the interest of the academic community in the discipline. At present, eight universities and institutions are active in undertaking education programmes in remote sensing and geographic information systems (GIS). These are the Obafemi Awolowo University, Ile-Ife, in cooperation with the Regional Centre for Training in Aerospace Surveys and the Centre for Space Science and Technology Education in Africa; the University of Nigeria, Nsukka; the University of Lagos; Bayero University, Kano; the University of Ilorin; the Federal University of Technology, Akure; the Federal University of Technology, Minna; and the National Centre for Remote Sensing, Jos. A number of these institutions are also contributing their expertise to the implementation of projects that require remote sensing input.

3. Nigeria is host to the Regional Centre for Training in Aerospace Surveys, one of the two regional remote sensing centres established by the Economic Commission for Africa to train African specialists in the understanding, interpretation and use of satellite remote sensing data in various aspects of economic and social development activity. Nigeria is also host to the African Regional Centre for Space Science and Technology Education—in English Language, affiliated to the United Nations, the goal of which is the development of skills and knowledge of university educators and research and applications scientists, through rigorous theory, research, applications, field exercises and pilot projects in those aspects of space science and technology that can enhance social and economic development in each participating country.

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II. New developments and future directions

4. In order to prepare for the future, the current focus of the Federal Government of Nigeria is to consolidate all the space science and technology-related activities that are taking place in the institutions mentioned above, in order for them to have a greater impact on development efforts in Nigeria. To that end, the Government established the National Space Research and Development Agency, whose immediate goals include the following:

(a) To undertake intensive human and institutional capacity-building in space science and technology fields with adequate input from research and application scientists as well as educators;

(b) To initiate programmes that will ensure a better understanding, nationally, of global climate change, with particular emphasis on how the burning of fossil fuels by industry and national transportation systems, in particular on Nigerian highways and in its urban centres, are affecting that change. Emphasis will also be placed on quantifying Nigeria's contributions to atmospheric aerosol emissions and their impact in the form of acid rain on Nigeria's forests, agriculture and weather patterns as well as on terrestrial and marine life;

(c) To establish a national data bank for archiving and interpretation of Earth observation satellite data as well as data from other related sources;

(d) To contribute to the implementation of a nation-wide information system based on the cooperative information network linking scientists, educators, professionals and decision makers in Africa (COPINE), an initiative of the Office for Outer Space Affairs of the United Nations Secretariat;

(e) To support existing research and development projects and programmes and to initiate other activities, as may be appropriate, in a number of key areas, including but not limited to the following:

(i) An understanding of the influence on the tropical climate of re-radiation of solar energy from the Earth's atmosphere into space;

(ii) Intensified solar energy research and development programmes, with a view to helping Nigeria benefit from that renewable source of energy;

(iii) Monitoring of the upwelling areas in Nigeria's coastal waters, in order to enhance the level of national income from the fishing industry;

(iv) Launching of a goal/mission-oriented micro-satellite programme that can attract the participation of Nigeria's best talents in science and engineering;

(f) To undertake a two-point approach in building space science and technology culture in the country through:

(i) The organization of orientation programmes for Nigeria's policy and decision makers, so that they can be more cognizant and appreciative of the role of space science and technology in the country's current development efforts and its future growth;

(ii) The development and provision of general education in space science and technology for the Nigerian public and for pupils at the elementary and secondary/grammar/high-school levels, in order to make Nigerians aware of (a) the world they live in; (b) their own environment and an understanding of the role of outer space in this environment; (c) their own contributions to the safety and management of this environment; and (d) their interrelationship with the rest of humanity and the universe;

(g) To pursue appropriate multilateral and bilateral cooperation programmes in order to achieve those objectives.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Tunisia

1. The opportunities and challenges presented by outer space were taken up in Tunisia at an early stage, a National Commission for Outer Space Affairs having been established shortly after the holding of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space in 1982.

2. The main objectives of that Commission were:

(a) To propose a national policy for the peaceful uses of outer space;

(b) To coordinate the activities of the various ministerial departments and organizations concerned with space applications and technology;

(c) To generate media and public awareness of the spin-off benefits of space for the country's scientific and socio-economic development.

3. The activities undertaken by the Commission between 1984 and 1987 led to the establishment of the National Remote Sensing Centre in 1988.

4. With a view to the acquisition of space technology, the State Secretariat for Scientific Research and Technology has carried out a number of activities since 1992, including in particular:

(a) The reactivation and revitalization of the National Commission for Outer Space Affairs in 1993, with a new composition and redefined operational modalities;

(b) The establishment of international cooperation links for the purpose of developing skills through training in space and aeronautical techniques and instruction in space technology applications;

(c) The setting up, at the Regional Institute for Computer Sciences and Telecommunications, of a space unit responsible for coordinating the activities of the various institutions involved in the sector (the National Institute of Meteorology, National Telecommunications Centre, the Arab Satellite Communications Organization, universities, etc.);

(d) The organization of awareness seminars on space issues, applications and technologies.

5. At the instigation of the State Secretariat for Scientific Research and Technology, the activities of the National Commission for Outer Space Affairs have been taken into account in the country's five-year development plans in the form of a National Space Programme.

6. The execution of this Programme has made it possible:

(a) To utilize space resources in providing various services, such as telecommunications, meteorology and remote sensing;

(b) To establish the necessary infrastructure and organizations to benefit from space-related applications;

(c) To create a pool of skills and expertise in space techniques and technologies;

(d) To contribute, at the regional and international levels, to the development of mutually beneficial space applications and to establish cooperation links with specialized centres and organizations.

7. On the basis of the capabilities acquired, which will be maintained and continuously developed, Tunisia will take steps to promote the exchange of experiences in space science and technology between developing countries and developed countries, and hopes that the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) will give rise to actions making it possible further to promote the applications of space technology in the developing countries in order to reduce the disparity in standards and advancement in relation to the developed countries.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Bolivia

1. Since the early 1970s, Bolivia has used Earth observation satellite data at the state level for mapping the country's renewable and non-renewable resources through the establishment of the ERTS programme within the Geological Service of Bolivia (formerly GEOBOL). Since that time, in addition to the intensive work of the Military Geographic Institute, which is conducting a national programme of map updating and surveying uncharted areas using optical and radar sensors, virtually all government agencies—the National Statistical Institute, the National Geology and Mining Service, the National Meteorology and Hydrology Service, the Agricultural and Forestry Supervisory Boards, the National Institute of Agrarian Reform and the Land Management Department of the Ministry for Sustainable Development and Planning, among others—have been using such space data to optimize their activities. Since the beginning of the 1990s, a series of university remote sensing and geographic information system (GIS) training centres have been set up at universities in the country's main cities (CAE-IE/Universidad Mayor de San Andrés, CLAS, CISTEL and CUEMAD of the Universidad Mayor de San Simón, CIMAR/Universidad Autónoma Gabriel René Moreno and the Noel Kempff Mercado Museum), research institutes such as the Bolivian Association for Environmental Remote Sensing (ABTEMA) have been established and a network of professionals in the fields of remote sensing and space sciences (SELPER-Bolivia) has been developed. The private forestry sector is also entering the remote sensing/GIS sector with PROMABOSQUE, a technical body of the Forestry Association.

2. These organizations use Earth observation satellite data for various applications, including mapping and monitoring natural phenomena and their impact, disaster management, agrometeorology, agriculture, land-use planning, freshwater resource development, studies on the focus of diseases, mining exploration and census and land registration applications.

3. In the area of navigation and location systems, the Military Geographic Institute, a national body equipped with a Global Positioning System (GPS) network with high precision points for monitoring the movement of tectonic plates, is initiating the establishment of active GPS systems.

4. With regard to communications, Bolivia, through the national telecommunications enterprise ENTEL, uses the International Telecommunications Satellite Organization, Domsat, Nahuelsat and Panamsat satellite systems for its communications at the national level. ENTEL recently granted the first mobile service licence to the firm Iridium for the use of non-geostationary low-orbiting satellite systems. Within the framework of the Andean Community of Nations, community authorization has been granted for the multinational firm ANDESAT-EMA to operate its satellite.

V.99-84283 (E)

5. The satellite telecommunications industry is the most developed sector of the space market in Bolivia, followed by GIS, GPS and remote sensing. In other areas, such as the development of computer equipment and programmes, advanced electronics, materials technology, satellite manufacture and biological sciences, there are no commercial activities.

6. With a view to initiating and promoting space-related commercial activities and secondary activities in support of the various industrial sectors, environmental monitoring, health and medicine, public safety and transport, thereby strengthening the four main focuses of action of the State, as defined in its General Economic and Social Development Plan, 1997-2002, the Science and Technology Commission of the Senate submitted to the latter for examination and approval, in late 1998, a legislative bill on the establishment of the National Commission for Space Sciences (CONCE), which had been drafted and agreed upon by the various sectors of civil society involved in those fields. This Commission will be the national counterpart institution in relations with international space science organizations; it will serve as the official regulatory and policy-making body in this field and be entrusted with the tasks of promoting and coordinating space science activities at the national level. It will be responsible for defining national space projects, plans and programmes and encouraging training, skills development and educational programmes in the different sectors of space sciences at the institutional, university and basic (primary and secondary) levels.

7. It is essential that this future body, whose governing board will comprise the various sectors of civil society involved and whose role will be of key importance in developing space sciences within the country and in familiarizing coming generations with the issues of sustainable socio-economic development, should be strengthened as from its establishment through the cooperation of Member States.

8. In addition to the officially submitted legislative bill referred to above, Bolivia is currently examining, with a view to ratification, the five treaties drawn up within the framework of the Committee on the Peaceful Uses of Outer Space. On the basis of an interinstitutional agreement with the Ministry of Education, the National Council for Science and Technology, the Executive Committee of the University of Bolivia, ABTEMA and SELPER-Bolivia, the Government initiated, in March 1999, under the auspices of the Organization of American States, a project for the inclusion of remote sensing in primary and secondary school curricula, in particular in the subject areas of language, geography, physics, mathematics, ecology/biology, computer science and technology, thereby making it possible to give young people a new vision of their natural resources and environment and to familiarize coming generations with environmental problems. It is important that this pioneer project should also receive the support of Member States in order to ensure its incorporation into the current educational reform programmes in Bolivia and in other countries.

Future courses of action

9. Bolivia is in need of increased international cooperation and support in the space sector to strengthen the four main focuses of action of the State, as defined in its General Economic and Social Development Plan, 1997-2002, in the following areas:

(a) Opportunity: industrial transformation, technology validation, environmental management and land-use planning;

(b) Equity: improved education at all levels and monitoring of urban development;

(c) Institution-building: strengthening of democracy through optimized access to information;

(d) Dignity: eradication of drug trafficking (illicit crop cultivation).

10. To that end, Bolivia has drafted a legislative bill on the establishment of CONCE, which is currently being examined in the National Congress. This Commission will be the official regulatory and policy-making body in this field and will be entrusted with the tasks of promoting and coordinating the space science activities of all sectors of civil society. It will also be responsible for defining all space projects, plans and programmes and will serve as the national counterpart in arranging and developing external cooperation in this field.

11. It is essential that this future body, which will be of key importance in developing space sciences within the country and in familiarizing coming generations with the issues of sustainable socio-economic development, and also the ongoing programme for the inclusion of space sciences in primary and secondary school curricula, should be strengthened through the cooperation of Member States, as provided for in the agenda for the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III).

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the paper of Ukraine

Ukrainian space activities on the threshold of the new millennium

1. Since the convening in 1982 of the Second United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE II), there have been considerable changes in the nature and content of international space activities, with a dramatic increase in the level of international cooperation and a greater appreciation of the potential of space to provide solutions to humanity's common problems.

2. Space activity in Ukraine forms an integral part of international efforts in the area of space exploration and applications. The Ukrainian space programme takes account of the goals and activities of the international organizations to which Ukraine belongs, as well as its national obligations under bilateral and multilateral agreements. In 1998, the Ukrainian parliament approved the new national space programme for 1998-2002, which is directed to a great degree towards international cooperation. Ukraine assigns great importance to its collaboration with China, the Russian Federation, the United States of America and Eastern European countries. The conclusions and recommendations of the Regional Preparatory Conference, which took place in January 1999 in Bucharest, reflect Ukraine's interests also.

3. Ukraine possesses unique scientific, technological and industrial capacities to conduct successful space activities in the interests of socio-economic development and to apply space technology in finding solutions to regional and global problems.

4. Ukraine's contribution towards resolving global problems through the use of space applications is aimed at the following:

(a) Preventing the degradation of vital natural systems;

(b) Providing warnings of environmental, man-made and space disasters;

(c) Developing fundamental scientific knowledge of near and deep space and of the most basic laws governing processes in the universe;

(d) Dissemination of scientific and technological knowledge obtained as a result of space research;

(e) By means of space technology, ensuring access to information sources and educational programmes throughout the world.

V.99-84289 (E)

5. An important place in Ukraine's space programme is occupied by research on near-Earth space and the Earth's surface:

(a) Ukrainian scientists are participating in the Interball project, an extremely large-scale international project directed towards research of the ionosphere;

(b) The investigation of ionospheric-lithospheric relations—a problem of primary significance in terms of pure science and practical applications—is the focus of an international scientific project entitled "Warnings". The success of the project will mark a qualitative leap forward in terms of both broadening knowledge of ionospheric processes and laying the foundations for a future-oriented space system for the monitoring of natural and man-made disasters;

(c) One of the most important challenges being tackled by Ukrainian specialists is to study the sea's surface, atmospheric and oceanic dynamics, and marine temperatures and colours by means of satellite data, such research constituting a basic component of environmental monitoring and surveillance of navigational hazards.

6. The following are the main areas in which international cooperation is being conducted in connection with remote sensing based on data from the Ukrainian Sich satellites, the Russo-Ukrainian spacecraft Okean and other similar facilities:

(a) Rational utilization of natural resources;

(b) Monitoring of sources of pollution of the atmosphere, water and soil;

(c) Operational monitoring of particularly hazardous natural features and industrial installations with a view to providing timely warnings of disasters and catastrophes and improving the effectiveness of disaster-management measures;

(d) Monitoring of factors influencing the generation of meteorological and climatic conditions for purposes of meteorological forecasting;

(e) Establishment of a system for modelling processes on the Earth with a view to predicting changes in the ecological balance and devising environmental protection techniques.

7. Ukraine's geopolitical position and its scientific and technological potential make it eminently qualified to take an active part in the establishment of the Global Information Infrastructure. We regard space telecommunications technology as one of a number of means of effectively ensuring Ukraine's integration within the community of developed countries.

8. The research programme conducted on the International Space Station will be one of the most important such programmes in the new millennium. The form of Ukraine's participation in this programme is currently under discussion.

9. The exploration and peaceful uses of outer space provide a means of achieving mutual understanding among nations through collaboration in the tackling of global problems. Ukraine regards itself as an active participant in this process, which is crucial in ensuring the pace of social progress.

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THIRD UNITED NATIONS CONFERENCE ON THE EXPLORATION AND PEACEFUL USES OF OUTER SPACE

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Abstract of the national paper of Italy

1. Italy's National Space Plan provides the basis for the scientific, technological and commercial applications of space activities. It coordinates, supports and directs Italian space activities and promotes the technological capabilities of Italian aerospace activities. The plan spans a five-year period and is updated annually. At present, the period covered is from 1998 to 2002.

2. Italy is a founding member of the European Space Agency (ESA) and through its participation in ESA programmes it contributes 15 per cent of the total budget of the Agency.

3. Italy is concerned with many issues addressed by the Third United Nations Conference on the Exploration and Peaceful Uses of Outer Space (UNISPACE III) in the context of the peaceful uses of outer space.

4. Remote sensing satellites are strategic in the protection of Earth and its environment. With this in mind, Italy participates in the Committee on Earth Observation Satellites (CEOS) and is actively involved in achieving the goals it sets. The Italian Space Agency (ASI) is part of the X-SAR programme with the German Space Agency (DARA) and the National Aeronautics and Space Administration (NASA) of the United States of America and the ESA Earth observation programme (ERS-2, Envisat 1 and Meteosat). The ASI Geodesy Space Centre in Matera plays an important international role in the receiving, processing and archiving of data, in particular in the Mediterranean basin, with its ERS-1 and ERS-2 satellites.

5. A new and most important ASI Earth observation programme is the Skymed Cosmo satellite constellation, a space-based disaster management system crucial for the detection of natural disasters and providing early warning. Other applications include civil protection, environmental monitoring, disaster monitoring, agricultural monitoring, cartography and mapping, urban monitoring, coastal monitoring and hydrological resources.

6. Satellite navigation and location systems have improved the efficiency of transport search and rescue, geodesy and other related activities and will become an integral part of future European infrastructure. Italy places high priority on navigation initiatives, in particular, the Galileo programme.

7. The most important commercial application of space is space telecommunications. Satellite-delivered multimedia services are of capital importance and Italy is working strongly in this direction with EuroSkyWay, a broadband network using Ka-band geostationary orbit

satellites to be integrated with a global network provider. Another application of space is in the realm of telemedicine. The SHARED network is an innovative mode of health care delivery that operates in remote and underserved areas.

8. National science programmes have added an important body of knowledge to space science. Scientific satellites have made internationally renowned discoveries that have enhanced the world's conception of the universe. For example, BeppoSAX has allowed scientists to view the visible light counterpart of gamma-ray bursts. Missions to Mars, Saturn and Titan (Cassini) in collaboration with NASA are part of science's exploration of outer space. Italian participation in ESA programmes is making significant contributions by means of the development of innovative scientific instrumentation. Research in microgravity in space debris is also being conducted with the objective of furthering mankind's knowledge.

9. Spin-off benefits and technology transfer are, of course, important aspects of space exploration. Italy is developing technological initiatives in the fields of electrical propulsion, materials, components, millimetric waves, optoelectronic sensors and photovoltaic cells. It is also actively promoting the development of a small launch vehicle in collaboration with ESA.

10. MITA and PRIMA represent an example of the ASI small satellite programme. Together they will provide low-risk and affordable access to space with the possibility of verifying and evaluating new technologies.

11. Education and training in space science technology represent an area to which Italy attributes the greatest importance. ASI plans to offer short intensive courses at the post-graduate level, fellowships and study programmes in secondary schools. In addition, it is active in the European International Space Year and the International Space University and has established a national point of contact for space law. An educational satellite mission is also in preparation.

12. Finally, the National Space Plan strongly promotes international bilateral and multilateral cooperation through the use and study of outer space for peaceful purposes. Italy is a member of ESA, the Committee on the Peaceful Uses of Outer Space, other international space organizations (the International Telecommunications Satellite Organization, the European Organization for the Exploitation of Meteorological Satellites, the International Mobile Satellite Organization and the International Telecommunication Union) and institutions involved in space (CEOS, the International Astronautical Federation, the International Academy of Astronautics, the Committee on Space Research, the International Civil Aviation Organization, the European International Space Year, the International Institute of Space Law, the European Centre for Space Law and others). The country is also an active participant in the International Space Station, an outstanding example of space cooperation. It is involved in the construction of the multi-purpose pressurized logistics models, Nodes 2 and 3, and the manned space programme. The International Space Station represents a true challenge for scientists of the space world.